



ENDOCRINOLOGY 2024



BMJ On Exam

English French

Question 1 of 121

☆ High impact question

A 56-year-old man is asked to attend the well man clinic because the nurse at his local surgery has registered him as obese.

He has a history of hypertension for which he takes ramipril and indapamide.

On examination his BP is 155/82 mmHg, pulse is 78 and regular. His BMI is 32.

Investigations:

Haemoglobin 137 g/L (135 - 177)

White cell count $7.0 \times 10^9 / L$ (4 - 11)

Platelets $179 \times 10^9 / L$ (150 - 400)

Sodium 141 mmol/L (135 - 146)

Potassium 3.9 mmol/L (3.5 - 5)

Creatinine $110 \mu mol/L$ (79 - 118)

Glucose 6.6 mmol/L (<7.0)

Which of the following is the most appropriate way to manage him?

- Metformin
- Sitagliptin
- Acarbose
- Liraglutide
- O Diet and exercise

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☆ High impact question

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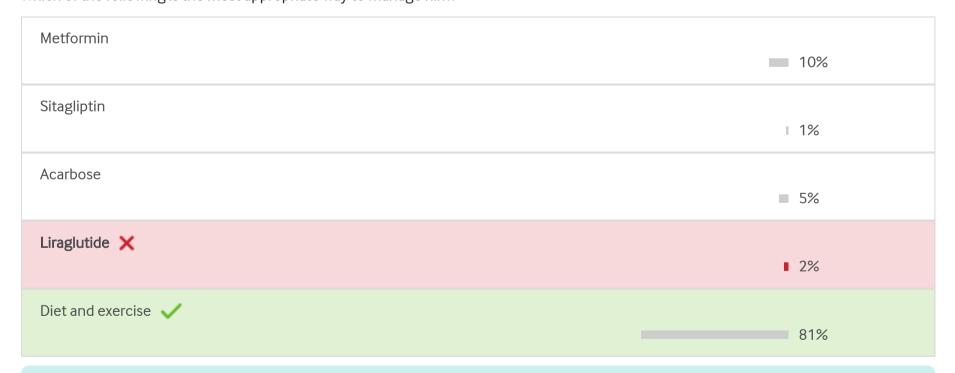
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Potassium	3.9 mmol/L	(3.5 - 5)
Creatinine	110 μmol/L	(79 - 118)
Glucose	6.6 mmol/L	(<7.0)

Which of the following is the most appropriate way to manage him?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• The initial treatment for impaired fasting glucose is diet and exercise advice.

Explanation

Despite the fact that both metformin and acarbose have positive data in the pre-diabetes population, neither is licensed for the treatment of impaired fasting glucose. As such diet and exercise is the treatment of choice.

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Both metformin and acarbose are shown to reduce the risk of type 2 diabetes in subjects with impaired glucose tolerance. In addition acarbose has been shown to reduce cardiovascular events. Neither however is an indication.

 $Liraglutide\ has\ been\ shown\ in\ type\ 2\ diabetes\ to\ improve\ HbA_{1c}\ and\ lead\ to\ weight\ loss,\ but\ trials\ in\ the\ obese\ are\ yet\ to\ complete.$

Sitagliptin is weight neutral and leads to modest reduction in HbA_{1c} in patients with type 2 diabetes.

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Question 2 of 121

A 59-year-old unemployed man presents to hospital.

He gives a history of weight loss over the past four months and also complains of weakness. Specifically, he has had difficulty climbing his stairs and in rising from his armchair at home.

He drinks 50 units of alcohol per week and has smoked 20 cigarettes daily for 40 years. He lives alone. His blood pressure is 197/98 mmHg. Investigations revealed:

Hb	99 g/L	(130-180)
WBC	9.8 ×10 ⁹ /L	(4-11)
Platelets	350 ×10 ⁹ /L	(150-400)
Sodium	145 mmol/L	(137-144)
Potassium	2.8 mmol/L	(3.5-4.9)
Urea	4.1 mmol/L	(2.5-7.5)
Creatinine	120 μmol/L	(60-110)
Bicarbonate	35 mmol/L	(20-28)
Glucose	12.9 mmol/L	(3.0-6.0)

An arterial blood gas shows a pH of 7.26.

Which of the following investigations would be most useful in establishing the cause of his illness?

Muscle biopsy
 Acetylcholine receptor antibodies
 Renin and aldosterone levels
 Chest x ray

Trial of guanidine hydrochloride

 \bigcirc

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Creatinine	120 μmol/L	(60-110)
Bicarbonate	35 mmol/L	(20-28)
Glucose	12.9 mmol/L	(3.0-6.0)

An arterial blood gas shows a pH of 7.26.

Which of the following investigations would be most useful in establishing the cause of his illness?

Muscle biopsy	9%
Acetylcholine receptor antibodies	11%
Renin and aldosterone levels	24%
Chest x ray 🗸	27%
Trial of guanidine hydrochloride 🗶	■ 2%

Key learning points 🖞

Endocrinology, Metabolism

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• Hypokalaemic metabolic alkalosis is seen in Cushing's syndrome.

Explanation

The patient is hypertensive with a hypokalaemic metabolic alkalosis and high blood glucose.

The most likely diagnosis is Cushing's syndrome secondary to ectopic ACTH secretion by a small cell carcinoma of the lung.

Myasthenia gravis is characterized by the development of acetylcholine receptor (AChR) autoantibodies.

A muscle biopsy may be required to confirm the underlying cause in a myopathy, there can be various findings including muscle vacuolation, inclusion body myositis, vasculitis and amyloid deposits.

Renin and aldosterone levels may be useful to explain the hypertension, however they do not provide an immediate solution for the weakness.

Guanidine hydrochloride inhibits voltage-gated potassium channels and enhances the release of acetylcholine, it was initially used as a treatment for Lambert Eaton Syndrome, however it is no longer in circulation due to multiple adverse effects.

Osteomalacia can also present as a proximal myopathy and vitamin D levels should be checked.

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Question 3 of 121

★ High impact question

This 34-year-old female presents with a nine month history of weight gain, weakness and amenorrhoea.



Examination reveals the appearances as shown, a blood pressure of 180/110 mmHg and proximal myopathy. Urinalysis shows ++ glucose and a pregnancy test is negative.

Which of the following would be the most appropriate diagnostic test?

- Oestradiol concentration
- Oral glucose tolerance test
- O Urine free cortisol estimation
- Random cortisol concentration
- O Pituitary MRI scan

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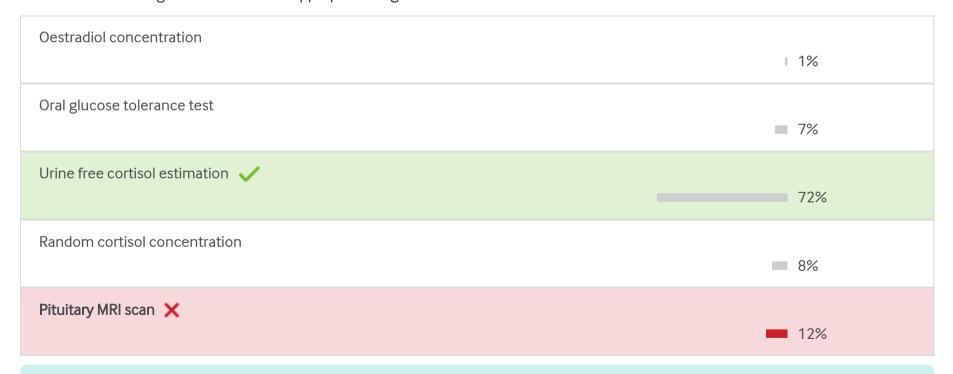
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Which of the following would be the most appropriate diagnostic test?



Key learning points **Q**



Diabetes, Endocrinology, Photographic

• Urinary free cortisol or 1 mg overnight dexamethasone suppression test has 95% sensitivity and specificity for diagnosing Cushing's syndrome

Explanation

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This patient appears typically cushingoid. She is also hypertensive, has glycosuria suggesting diabetes and has a proximal myopathy. The diagnosis is likely to be Cushing's syndrome and the most appropriate investigation would be urine free cortisol (UFC) estimation.

Elevated UFC has high sensitivity and specificity (above 95%) for the diagnosis of Cushing's syndrome. Another useful screening test would be the 1 mg overnight dexamethasone suppression test which has similar sensitivity and specificity.

Features that would argue against pseudo-Cushing's due to obesity or <u>polycystic ovary syndrome</u> (PCOS) would be proximal myopathy, easy bruising and thin skin.

Amenorrhoea is often associated and is due to hypogonadotrophic hypogonadism.

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Question 4 of 121

A 45-year-old man presented to hospital with severe pain in his thighs and buttocks associated with difficulty in walking. During the two months prior to his presentation he had noticed increasing difficulty climbing the stairs at home and rising from a chair.

The pain in his thighs had started gradually, beginning in the right leg and then in the left leg. The pain was not related to exertion, and was now sufficiently severe to keep him awake at night. He also complained of fatigue and had lost 8 kg in weight over the preceding six months despite having a good appetite.

He had been diagnosed diabetic two years previously, but was an infrequent attender at his General Practitioner's diabetic clinic. He maintained that he adhered to his diabetic diet and continued to take the chlorpropamide that had been prescribed from the clinic. He lives alone, smokes 20 cigarettes a day and drinks approximately 12 units of alcohol per week.

On examination he appeared thin and in discomfort. There was wasting of the quadriceps muscles bilaterally with loss of power (grade 3/5). Knee and ankle jerks could not be elicited and both plantar responses were extensor. There was some loss of light touch and pinprick sensation over both feet and ankles.

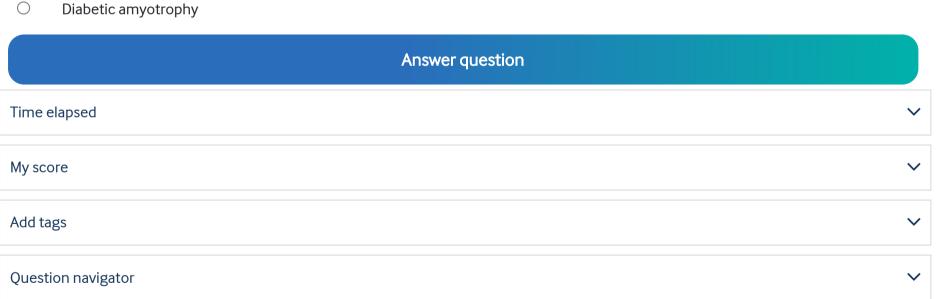
Urinalysis revealed trace amounts of protein and glucose 1%.

\bigcirc	Cauda equina lesion
\circ	Peripheral vascular disease
\bigcirc	Polymyalgia rheumatica

What is the most likely diagnosis?

\bigcirc	Polymyositis	

D: - b - +: + b -
Diabetic amyotrophy



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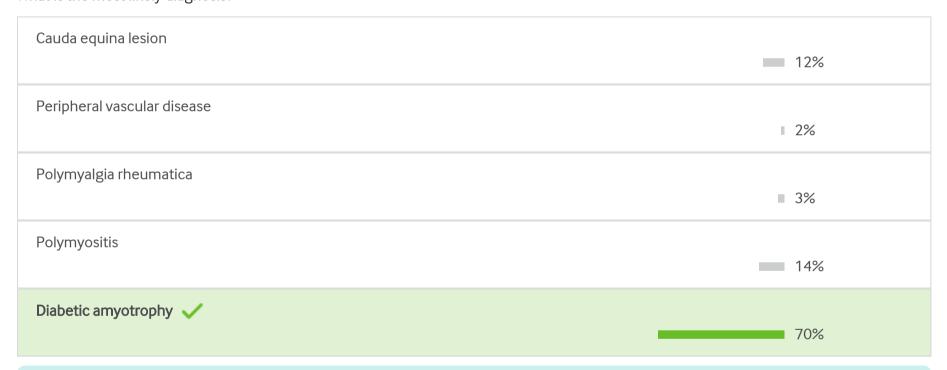
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Urinalysis revealed trace amounts of protein and glucose 1%.

What is the most likely diagnosis?



Endocrinology

• Diabetic amyotrophy affects femoral nerve, lumbosacral plexus ad lumbar roots

Explanation

Diabetic amyotrophy is thought to be a form of neuropathy but may occur due to inflammation rather than chronically poor glycaemic control. There is higher incidence amongst type 2 diabetics.

Diabetic amyotrophy often affects the femoral nerve, lumosacral plexus or lumbar roots.

Clinical symptoms include pain in the hip, buttock or thigh with associated weakness. There is often little sensory loss. Plantar responses may be flexor or extensor. EMG shows multifocal denervation in paraspinous & leg muscles.

Partial or complete resolution occurs with control of hyperglycaemia.

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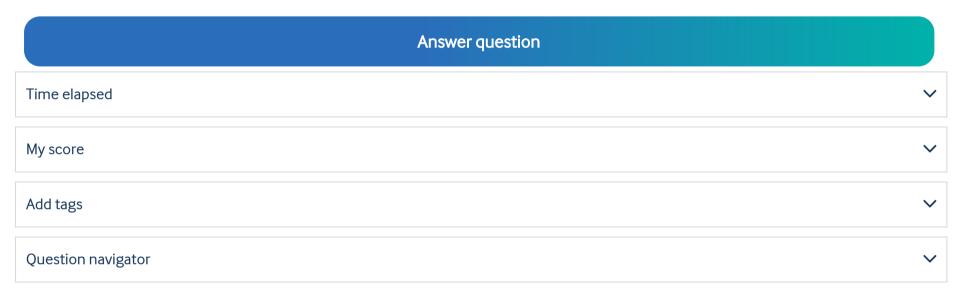
★ High impact question

A 29-year-old man with a 20 year history of type 1 diabetes and recent poor glycaemic control comes to the clinic for review. He is overweight with abnormal LDL cholesterol and wants to try liraglutide as an adjunct to his insulin therapy. On examination his BP is 155/92 mmHg, pulse is 72/min and regular. His BMI is elevated at 32. A recent HbA_{1c} was 66.1 mmol/mol (35 - 55 mmol/mol).

Which of the following should he expect from adding liraglutide to his regime?

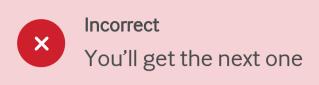
\bigcirc	Weight loss
\circ	Reduced HbA _{1c}

- O Increased frequency of hypoglycaemia
- O Decreased heart rate
- O Partial remission of diabetes



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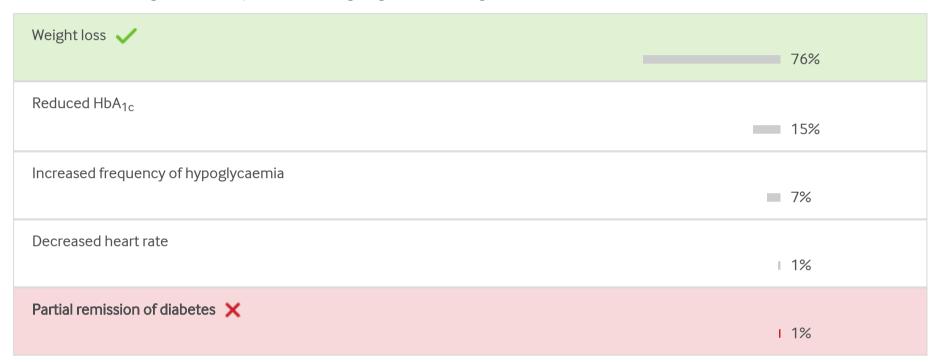
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Which of the following should he expect from adding liraglutide to his regime?



Endocrinology

• The main benefit of GLP-1 therapy in patients with established type 1 diabetes appears to be in reducing body weight.

Explanation

Although some patients may gain a degree of partial remission from GLP-1 therapy in type 1 diabetes, those with established disease are only likely to gain weight loss benefit. It is well known that liragilutide is associated with weight loss in type 2 diabetes and obesity; similarly in obese type 1 diabetes, weight loss of approximately 6% at 6 months can be achieved with liragilutide 1.8 mg.

Liraglutide is associated with an approximately 7 beats per minute increase in heart rate versus control in type 1 diabetes, this is similar to changes in heart rate seen in patients with type 2 diabetes. Rather than an increase in hypoglycaemia, liraglutide is associated with a modest reduction in hypoglycaemia, and very little difference in HbA_{1c} for patients with established type 1 diabetes. In those with early disease who have residual c-peptide, off-loading of hyperglucagonaemia by giving GLP-1 therapy may drive an increase in the percentage of patients achieving partial remission, (HbA_{1c} <7% and insulin dose less than 0.5 U/kg/day).

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Question 6 of 121

★ High impact question

A 36-year-old woman is referred by her general practitioner with weight loss and agitation of two months duration.

The GP had noted that she had a mild tachycardia, fine tremor, lid lag and a small goitre and sent blood for thyroid function tests which showed:

Serum free T4 38.5 pmol/L (10-22)

Serum TSH <0.02 mU/L (0.4-5.0)

The patient was started on carbimazole 40 mg per day by the GP and referred to clinic.

She is seen in the outpatient clinic two weeks later. She now reports a tickly, sore throat but is otherwise well.

Investigations show:

Haemoglobin128 g/L(115-165)MCV79 fL(80-96)White cell count $4.8 \times 10^9 \text{/L}$ (4-11)Neutrophils $2.6 \times 10^9 \text{/L}$ (1.5-7)Lymphocytes $2.0 \times 10^9 \text{/L}$ (1.5-4)Basophils $0.08 \times 10^9 \text{/L}$ (0-0.1)Eosinophils $0.1 \times 10^9 \text{/L}$ (0.04-0.4)Platelets $210 \times 10^9 \text{/L}$ (150-400)

What is the most appropriate treatment strategy for this patient?

- Stop carbimazole
- Reduce dose of carbimazole
- Admit to hospital
- O Stop carbimazole and start course amoxicillin
- O Continue carbimazole and reassure

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What is the most appropriate treatment strategy for this patient?

Stop carbimazole	
	■ 5%
Reduce dose of carbimazole	
	■ 5%
Admit to hospital	
	■ 2%
Stop carbimazole and start course amoxicillin	
	■ 5%
Continue carbimazole and reassure 🗸	
	84%

Key learning points

Endocrinology

• Less than 1% of patients suffer leukopenia or neutropenia as a result of thionamides

Explanation

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Lots of people get a sore throat but everyone is warned about a sore throat when taking thionamides.

However, the incidence of leukopenia/neutropenia with carbimazole is less than 1%.

In this particular case her white blood cell (WBC) is normal with normal differential, and the low mean corpuscular volume (MCV) may reflect a mild iron deficiency in a menstruant female.

There is no requirement to stop therapy and she should be reassured.

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Question 7 of 121

A 55-year-old man was diagnosed with atrial fibrillation and commenced on amiodarone 2 years ago.

His thyroid function tests prior to commencing amiodarone were normal. He subsequently developed hyperthyroidism whilst on amiodarone. Amiodarone was stopped 4 months ago but he continued to lose weight despite maintaining a good appetite. His present medications comprise digoxin 250 µg OD and warfarin as per INR. There is no family history of thyroid disease.

On examination, pulse was 92 beats per minute, irregularly irregular, blood pressure was 130/70 mmHg. There was no goitre palpable on neck examination and he had no visible tremors.

Investigations:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.1 mmol/L	(3.5-4.9)
Serum urea	3.8 mmol/L	(2.5-7.5)
Serum creatinine	88 μmol/L	(60-110)
Plasma free T4	56 pmol/L	(10-22)
Plasma free T3	14.2 pmol/L	(5-10)
Plasma thyroid-stimulating hormone	<0.02 mU/L	(0.4-5)
Serum antithyroid peroxidase	12 U/mL	(<50)
TSH receptor antibodies	<1 U/L	(<7)

What is the next most appropriate investigation?

- O Serum interleukin6 levels
- O Ultrasound scan of thyroid (without flow doppler)
- O Serum desethyl amiodarone levels
- Radioactive iodine uptake scan
- Thyroid hormone receptor studies

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TSH receptor antibodies	<1 U/L	(<7)

What is the next most appropriate investigation?

Serum interleukin6 levels	■ 7%
	170
Ultrasound scan of thyroid (without flow doppler)	14%
Serum desethyl amiodarone levels	13%
Radioactive iodine uptake scan 🗸	13/0
Radioactive todine aptake scarr	61%
Thyroid hormone receptor studies 🗶	- 50/
	5 %

Key learning points 🛭

Endocrinology

• Radio-iodine uptake scan will help differentiate amiodarone induced thyrotoxicosis type 1 from 2, as they are treated differently.

Explanation

This patient requires a radioiodine uptake scan to distinguish between <u>amiodarone induced thyrotoxicosis</u> type 1 or type 2.

Type 1 is associated with pre-existing underlying thyroid pathology, where there is accelerated thyroid hormone synthesis secondary to iodide load. There is normal or high tracer up-take in radio-iodine uptake scan. It should be treated with anti-thyroid drugs.

Type 2 amiodarone induced thyrotoxicosis is due to the direct effect of amiodarone on the follicular cells, with breakdown of cells and therefore release of T4 and T3. There is reduced tracer uptake in radio-iodine uptake scan. It will eventually result in hypothyroid stage prior to recovery. Type 2 is treated with a trial of steroids.

Amiodarone is an iodine rich compound which is highly lipid soluble and so is concentrated in thyroid gland, adipose tissue, muscle and other tissues. This accumulation results in inhibition of enzymes related to clearing T4 and reverse T3, inhibition of entry of T4 and T3 into peripheral tissues and disturbance of thyroid follicular cells. Therefore, first investigations include blood tests. Imaging studies are necessary to recognise the correct type of amiodarone induced thyrotoxicosis. Colour flow Doppler ultrasonography visualises the amount of blood flow within the thyroid. However, the accuracy of this tool is limited by the proficiency of the sonographer and therefore is less preferable. Doppler flow is widely available but uncommonly used

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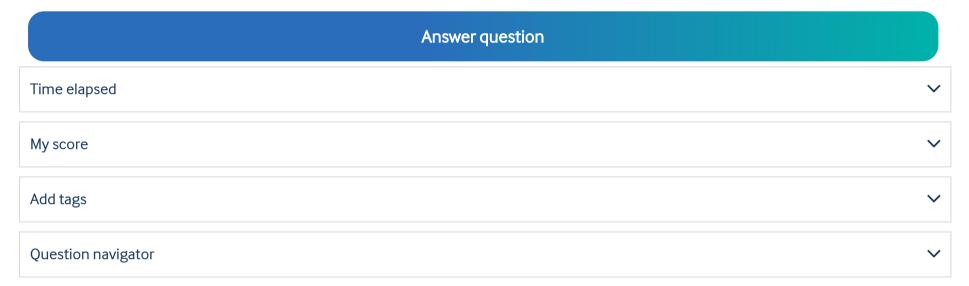
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Question 8 of 121

How should the oral glucose tolerance test (OGTT) be performed in the diagnosis of diabetes?

- O After an overnight fast, give 50 g anhydrous glucose and take blood sample for glucose and growth hormone at 120 minutes
- O After a two hour fast, give 75 g anhydrous glucose and take blood sample for glucose at 60 and 120 minutes
- O After an overnight fast, give 75 g glucose and take a blood sample for glucose at 60 and 120 minutes
- After a two hour fast, take a blood sample for glucose, give 75 g hydrous glucose and take further sample at 120 minutes.
- After an overnight fast, take a blood sample for glucose, give 75 g anhydrous glucose and take further sample at 120 minutes



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How should the oral glucose tolerance test (OGTT) be performed in the diagnosis of diabetes?

After an overnight fast, give 50 g anhydrous glucose and take blood sample for glucose and growth hormone at 120 minutes

2%

After a two hour fast, give 75 g anhydrous glucose and take blood sample for glucose at 60 and 120 minutes

5%

After an overnight fast, give 75 g glucose and take a blood sample for glucose at 60 and 120 minutes

23%

After a two hour fast, take a blood sample for glucose, give 75 g hydrous glucose and take further sample at 120 minutes.

7%

63%

After an overnight fast, take a blood sample for glucose, give 75 g anhydrous glucose and take further sample at 120 minutes 🗸



Endocrinology

• The diagnosis of diabetes mellitus.

Explanation

The OGTT has been used for many decades to diagnose diabetes. The test requires:

- Overnight fast prior to the test
- Normal eating the previous day
- Baseline sample for glucose using a fluoride tube
- 75 g oral anhydrous glucose usually washed down in 250-300 ml water (if hydrous glucose is used, the same weight represents a lower proportion of glucose in molar measurement)
- Further glucose sample taken at 120 minutes
- Plasma tubes, such as fluoride oxalate, must be used as the test results have not been validated using serum samples
- Serum samples without additives allow further metabolism of the glucose by the red cells and may give a falsely low value. Fluoride oxalate prevents further metabolism of glucose.

The OGTT test has poor reproducibility but is particularly useful in cases of borderline diabetes or gestational diabetes.

The diagnosis of diabetes requires (WHO guidelines):

- Fasting plasma glucose >7.0 mmol/l
- Random plasma glucose >11.1 mmol/l
- 75 g OGTT two hour plasma glucose >11.1 mmol/l.

The American Diabetes Association has recently added another criterion:

• HbA1c >6.5% or 48 mmol/mol.

Diagnosis should generally not be made on a single fasting glucose sample, especially if the patient was unwell as the stress response affects glucose homeostasis. Note that the introduction of HbA1c is controversial.

HbA1c is affected by many factors:

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- Elevated HbA1c can occur in iron deficiency, vitamin B₁₂ deficiency, alcohol dependence, chronic renal failure, hyperbilirubinaemia and splenectomy
- Reduced HbA1c can occur in chronic liver disease, hypertriglyceridaemia, some haemoglobinopathies, splenomegaly, rheumatoid arthritis and certain medications, including iron or vitamins B₁₂, C or E, antiretrovirals and dapsone.

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English French

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A 64-year-old male presents to his general practitioner for a health insurance medical and is concerned about his general health.

He has been otherwise well except for a diagnosis of hypertension two years ago when he was placed on a diet. He stopped smoking 10 years ago and drinks approximately 20 units of alcohol weekly. Currently he takes no medication.

He is concerned that his elder brother has recently been diagnosed with diabetes mellitus and has commenced oral therapy. His father and mother also had diabetes and died of stroke and myocardial infarction respectively.

He also informs you that he is concerned about his weight.

On examination, his BMI is $33.4 \, \text{kg/m}^2$, pulse is $82 \, \text{beats}$ per minute, with a blood pressure of $148/92 \, \text{mmHg}$. Cardiovascular, respiratory and abdominal examination are normal except for central adiposity.

Investigations reveal:

Full blood count	Normal	
Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.4 mmol/L	(3.5-4.9)
Serum urea	6 mmol/L	(2.5-7.5)
Fasting plasma glucose	6.4 mmol/L	(3.0-6.0)
Alkaline phosphatase	135 U/L	(60-110)
Aspartate transaminase	35 U/L	(5-35)
Serum cholesterol	5.6 mmol/L	(<5.2)
Serum triglycerides	3.2 mmol/L	(0.45-1.69)

Which of the following is the most appropriate strategy to reduce the future risk of this patient developing diabetes mellitus?

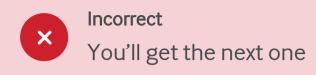
- O Treat with orlistat and diet
- Treat with ACE inhibitor and diet
- Treat with statin and diet
- O Treat with metformin and diet
- O Reduce alcohol intake and continue with dietary treatment

Answer question Time elapsed My score Add tags Question navigator

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BMJ On Exam

English French



A 64-year-old male presents to his general practitioner for a health insurance medical and is concerned about his general health.

He has been otherwise well except for a diagnosis of hypertension two years ago when he was placed on a diet. He stopped smoking 10 years ago and drinks approximately 20 units of alcohol weekly. Currently he takes no medication.

He is concerned that his elder brother has recently been diagnosed with diabetes mellitus and has commenced oral therapy. His father and mother also had diabetes and died of stroke and myocardial infarction respectively.

He also informs you that he is concerned about his weight.

On examination, his BMI is 33.4 kg/m², pulse is 82 beats per minute, with a blood pressure of 148/92 mmHg. Cardiovascular, respiratory and abdominal examination are normal except for central adiposity.

Investigations reveal:

Full blood count	Normal	
Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.4 mmol/L	(3.5-4.9)
Serum urea	6 mmol/L	(2.5-7.5)
Fasting plasma glucose	6.4 mmol/L	(3.0-6.0)
Alkaline phosphatase	135 U/L	(60-110)
Aspartate transaminase	35 U/L	(5-35)
Serum cholesterol	5.6 mmol/L	(<5.2)
Serum triglycerides	3.2 mmol/L	(0.45-1.69)

Which of the following is the most appropriate strategy to reduce the future risk of this patient developing diabetes mellitus?

Treat with orlistat and diet 🗸	13%
Treat with ACE inhibitor and diet	10%
Treat with statin and diet	22%
Treat with metformin and diet 🗶	18%
Reduce alcohol intake and continue with dietary treatment	37%

Key learning points 🛭



Diabetes, Endocrinology, Pharmacology

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• Xendos study concludes orlistat and diet control reduces risk of diabetes in obese patients by 38%

Explanation

This patient has the <u>metabolic syndrome</u> and runs a high risk of developing diabetes mellitus in the future (i.e. he has the prediabetes category, impaired fasting glucose [IFG]).

The cardinal features of the <u>metabolic syndrome</u> include:

- the hypertension
- central adiposity
- hyperlipidaemia
- "fatty liver" (we presume his raised transaminases are due to this and/or alcohol)
- pre-diabetes.

The <u>XENDOS study</u> revealed that orlistat, in combination with diet, will reduce the risk of diabetes in these obese patients by 38% more than just diet alone plus placebo.

Next question

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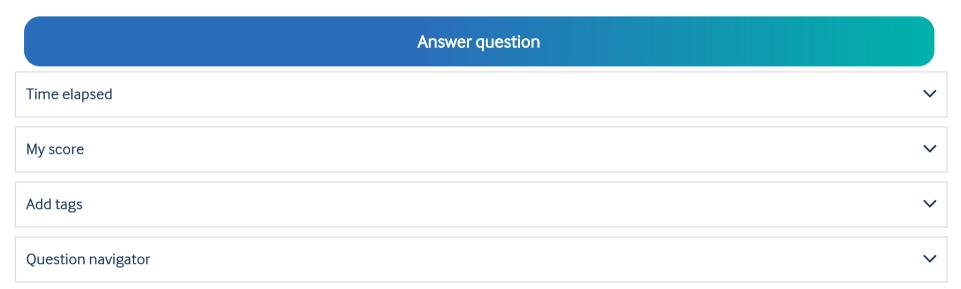
Question 10 of 121

A 52-year-old female presents with agitation and weight loss.

Examination reveals a fine tremor, goitre and tachycardia. Investigations confirm thyrotoxicosis with positive TSH receptor autoantibodies. She elects to receive radioactive iodine treatment.

Which of the following statements concerning therapy for this patient is correct?

- O Long-term studies do reveal a slightly increased risk of gastric neoplasia following radioactive iodine
- A reduction in the size of the goitre would be expected in approximately 90% of cases following radio-iodine treatment
- O There is less than 30% chance of hypothyroidism in the long-term following radioactive iodine treatment
- O The risk of recurrence after anti-thyroid drugs is above 50%
- O There is a long term two fold risk of thyroid neoplasia following radio-iodine treatment

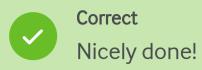


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A 52-year-old female presents with agitation and weight loss.

Examination reveals a fine tremor, goitre and tachycardia. Investigations confirm thyrotoxicosis with positive TSH receptor autoantibodies. She elects to receive radioactive iodine treatment.

Which of the following statements concerning therapy for this patient is correct?

Long-term studies do reveal a slightly increased risk of gastric neoplasia following radioactive iodine 11% A reduction in the size of the goitre would be expected in approximately 90% of cases following radio-iodine treatment 30% There is less than 30% chance of hypothyroidism in the long-term following radioactive iodine treatment 21% The risk of recurrence after anti-thyroid drugs is above 50% 🗸 21% There is a long term two fold risk of thyroid neoplasia following radio-iodine treatment 18%

Key learning points 💡



Endocrinology

• There is 50% chance of recurrence following treatment with antithyroid medications

Explanation

Current strategies for the treatment of thyrotoxicosis include a variable treatment period of anti-thyroid drugs such as carbimazole or propylthiouracil, radio-iodine or surgery.

Long-term remission following antithyroid drugs is of the order of 15%, with the vast majority relapsing. Thus, frequently, radioiodine is advocated as a primary treatment - particularly for multi-nodular or toxic solitary nodules. However, approximately 80% will have long-term hypothyroidism following radio-iodine.

There is no evidence of increased risk of thyroid neoplasia or gastric neoplasia following radioactive iodine (RAI).

Goitre shrinkage may occur in up to 30% following RAI.

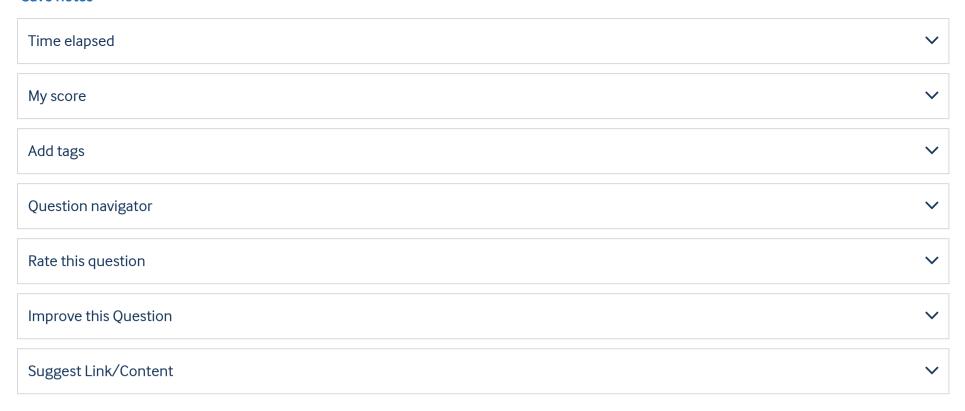
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Question 11 of 121

A 53-year-old South Asian woman presents to the clinic complaining of generalised aches and pains. She has been living in the United Kingdom for many years, follows a vegetarian diet and rarely goes out of the house.

Medication includes metformin which she takes for recently diagnosed type 2 diabetes.

On examination her BP is 155/82 mmHg, she has generalised bony aches and pains, worse over her back and hips. Her BMI is 28.

Investigations show:

Haemoglobin	120 g/L	(115-160)
White cell count	7.0 ×10 ⁹ /L	(4-11)
Platelets	228 ×10 ⁹ /L	(150-400)
Sodium	138 mmol/L	(135-146)
Potassium	3.9 mmol/L	(3.5-5)
Creatinine	113 μmol/L	(79-118)
Calcium	2.05 mmol/L	(2.21-2.60)
Alkaline phosphatase	265 U/L	(39-117)

Which of the following is the most likely diagnosis?

- Hypothyroidism
- O Vitamin D intoxication
- Osteomalacia
- Hyperparathyroidism
- Hypoparathyroidism

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A 53-year-old South Asian woman presents to the clinic complaining of generalised aches and pains. She has been living in the United Kingdom for many years, follows a vegetarian diet and rarely goes out of the house.

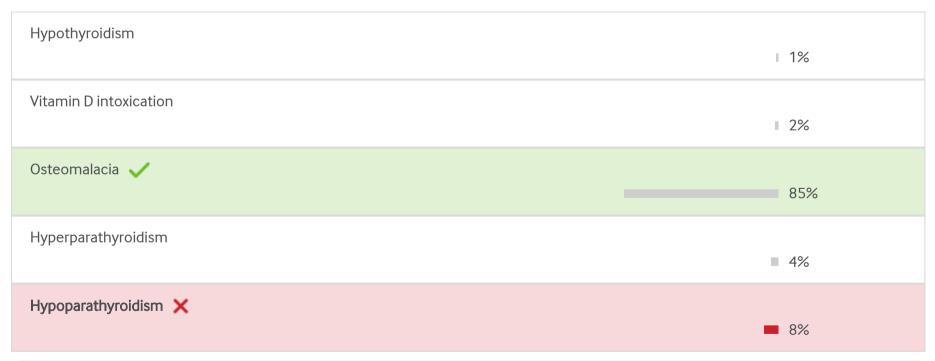
Medication includes metformin which she takes for recently diagnosed type 2 diabetes.

On examination her BP is 155/82 mmHg, she has generalised bony aches and pains, worse over her back and hips. Her BMI is 28.

Investigations show:

Haemoglobin	120 g/L	(115-160)
White cell count	7.0 ×10 ⁹ /L	(4-11)
Platelets	228 ×10 ⁹ /L	(150-400)
Sodium	138 mmol/L	(135-146)
Potassium	3.9 mmol/L	(3.5-5)
Creatinine	113 μmol/L	(79-118)
Calcium	2.05 mmol/L	(2.21-2.60)
Alkaline phosphatase	265 U/L	(39-117)

Which of the following is the most likely diagnosis?



Endocrinology

• Patients who have limited sun exposure or are fully covered for religious reasons should be screen for Vitamin D deficiency.

Explanation

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The low calcium and raised alkaline phosphatase are highly suggestive of <u>osteomalacia</u> caused by vitamin D deficiency. It occurs with frequency in some Asian women who tend to stay inside away from the sun and pursue a vegetarian diet, high in phytates. Treatment is calcium and vitamin D supplementation.

<u>Secondary hyperparathyroidism</u> occurs in the presence of renal dysfunction and there is no evidence of that.

Primary hyperparathyroidism and vitamin D intoxication result in hypercalcaemia.

<u>Hypoparathyroidism</u> is much less common in this population than osteomalacia.

Hypothyroidism is not associated with hypocalcaemia.

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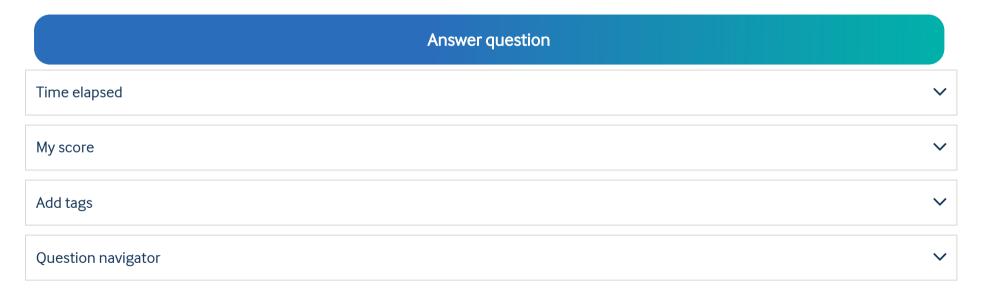
English French

Question 12 of 121



Which of the following investigations is most likely to establish the diagnosis for the patient pictured above?

- O Oesophago-gastroduodenoscopy
- O Measurement of urinary porphyrins
- O Dexamethasone suppression test
- O ACTH stimulation (Synacthen) test
- O Lundh meal



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Which of the following investigations is most likely to establish the diagnosis for the patient pictured above?

Oesophago-gastroduodenoscopy	9%
Measurement of urinary porphyrins	■ 5%
Dexamethasone suppression test	8 %
ACTH stimulation (Synacthen) test 🗸	77%
Lundh meal 🗙	■ 2%

Key learning points **W**



Endocrinology, Photographic

• Addison's disease is diagnosed by short synacthen test.

Explanation

The slide shows the characteristic pigmentation of the buccal mucosa in Addison's disease.

Diagnosis is made by demonstrating low cortisol levels without diurnal variation with a raised adrenocorticotrophic hormone (ACTH); a Synacthen test will show failure of cortisol secretion following subcutaneous administration of ACTH.

Addison's disease is also associated with a low or absent 24 hour urinary cortisol level.

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Question 13 of 121

This is the MRI scan of a 22-year-old female who presents with a six month history of secondary amenorrhoea.



She is otherwise well and there are no abnormalities on physical examination.

From the history and MRI appearance, what is the most likely diagnosis?

- Microprolactinoma
- O Non-functioning pituitary tumour
- O Polycystic ovarian syndrome
- Acromegaly
- O Kallmann's syndrome

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This is the MRI scan of a 22-year-old female who presents with a six month history of secondary amenorrhoea.



She is otherwise well and there are no abnormalities on physical examination.

From the history and MRI appearance, what is the most likely diagnosis?

Microprolactinoma 🗸	48%
Non-functioning pituitary tumour	35%
Polycystic ovarian syndrome	■ 6%
Acromegaly X	4 %
Kallmann's syndrome	■ 7%

Key learning points 🛭

Endocrinology, Radiology

• Lesion <1 cm in the pituitary and hyperprolactinaemia is MICROprolactinoma

Explanation

The MRI scan with contrast reveals a slight hypointense abnormality on the right side of the pituitary as we look at it (left side of patient). See this image for a magnifiable image of a pituitary microadenoma.

In this case with the history of secondary amenorrhoea and this small (less than 1 cm lesion) the likely diagnosis is a microprolactinoma. It may be accompanied by galactorrhoea but this is not absolute.

Hyperprolactinaemia is found in association with a hypogonadotrophic hypogonadism (low/normal LH/FSH with low oestradiol).

Next question

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BMJ On Exam

English French

Question 14 of 121

A 17-year-old man presents to the endocrine clinic for review. For as long as he can remember he has passed large amounts of urine, a number of times per day, and has been prescribed indomethacin by his GP in an attempt to reduce his urine output. He tells you that his elder sister suffers from a similar condition, but only really had symptoms of polyuria when she was pregnant. On examination his BP is 122/82 mmHg, with a postural drop of 15 mmHg, his pulse is 80/min and regular.

Investigations:

НЬ	145 g/l	(135-180)
WCC	5.1x10(9)/I	(3.8-10.8)
PLT	221x10(9)/I	(150-450)
Na	147 mmol/l	(135-145)
K	5.1 mmol/l	(3.5-5.5)
Bicarbonate	27 mmol/l	(18-28)
Cr	125 micromol/l	(60-110)
Glucose	5.1 mmol/l	(<7)

Which of the following additional interventions is he most likely to benefit from?

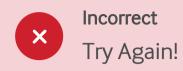
- O High salt diet
- O Low protein diet
- Exogenous ADH
- Sildenafil
- Furosemide

Answer question Time elapsed My score Add tags Question navigator

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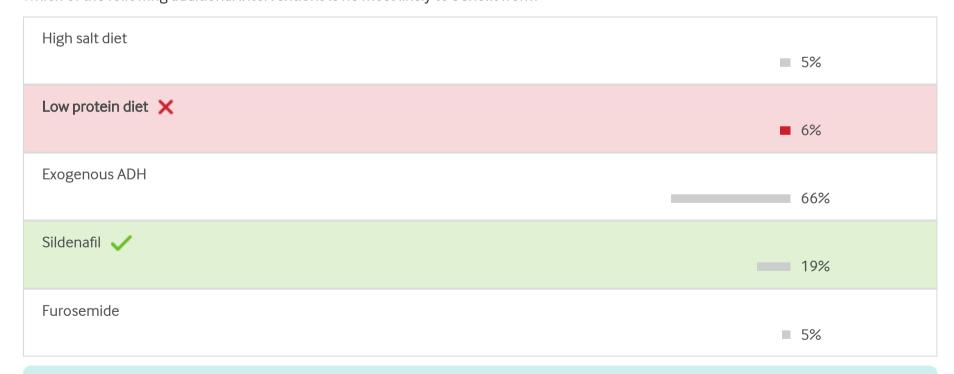


A 17-year-old man presents to the endocrine clinic for review. For as long as he can remember he has passed large amounts of urine, a number of times per day, and has been prescribed indomethacin by his GP in an attempt to reduce his urine output. He tells you that his elder sister suffers from a similar condition, but only really had symptoms of polyuria when she was pregnant. On examination his BP is 122/82 mmHg, with a postural drop of 15 mmHg, his pulse is 80/min and regular.

Investigations:

НЬ	145 g/l	(135-180)
WCC	5.1x10(9)/I	(3.8-10.8)
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Na	147 mmol/l	(135-145)
K	5.1 mmol/l	(3.5-5.5)
Bicarbonate	27 mmol/l	(18-28)
Cr	125 micromol/l	(60-110)
Glucose	5.1 mmol/l	(<7)

Which of the following additional interventions is he most likely to benefit from?



Key learning points 🛭

Endocrinology

• Sildenafil and other phosphodiesterase inhibitors may substantially reduce urine output in nephrogenic diabetes insipidus.

Explanation

The answer is E, sildenafil. Sildenafil, a phosphodiesterase inhibitor, has been shown to substantially reduce urine output in patients with congenital x-linked nephrogenic <u>diabetes insipidus</u>, the most likely diagnosis here, given that his symptoms are much worse than those of his sister. NSAIDs and thiazide diuretics may also be of value, but congenital nephrogenic DI is generally unresponsive

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to exogenous ADH.

Reducing salt and protein intake reduces the concentration of urinary solutes and therefore may reduce polyuria, the reduction may however significantly impact on diet and effect may only be modest. Thiazides rather than loop diuretics are more effective in reducing urine output in congenital nephrogenic DI.

References:

<u>Sildenafil for the Treatment of Congenital Nephrogenic Diabetes Insipidus.</u>

Next question

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BMJ On Exam

English French

Question 15 of 121

☆ High impact question

A 26-year-old female presents with fatigue and weight loss.

Six years previously she had been diagnosed with type 1 diabetes mellitus (T1DM) following diabetic ketoacidosis. She had been well up until the last year, since when she has been admitted on two occasions with diabetic ketoacidosis. She is currently receiving soluble insulin three times daily and long acting insulin in the evening.

Over the last year she had lost approximately 10 kg in weight and over the last three months had generally lost her appetite. She had also been amenorrhoeic over the last three months.

Examination reveals a thin female (BMI 19) with a pulse of 76 beats per minute and a blood pressure of 116/80 mmHg (with a postural drop). Cardiovascular, respiratory and abdominal examination were normal. Sensation was intact and fundal examination is normal.

Investigations reveal:

Serum sodium	128 mmol/L	(137-144)
Serum potassium	5.2 mmol/L	(3.5-4.9)
Serum urea	7.8 mmol/L	(2.5-7.5)
Serum creatinine	110 μmol/L	(60-110)
Serum glucose	11.6 mmol/L	(3.0-6.0)
HbA _{1c}	79 mmol/mol	(20-42)
	9.4%	(3.8-6.4)
Serum calcium	2.95 mmol/L	(2.2-2.6)
Serum phosphate	0.8 mmol/L	(0.8-1.4)
Serum free T4	8.2 pmol/L	(10-22)
Serum TSH	5.2 mU/L	(0.4-5.0)
Serum oestradiol	80 pmol/L	(130-850)
Serum LH	4.4 mU/L	(2-10)
Serum FSH	2.2 mU/L	(2-10)
Serum prolactin	400 mU/L	(50-450)

Which of the following is the most appropriate investigation for this patient?

- Pregnancy test
- O Pituitary CT scan
- O Synacthen test
- O Thyroid uptake scan

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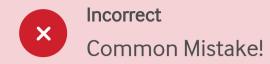
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PTH concentration

	Answer question
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★ High impact question

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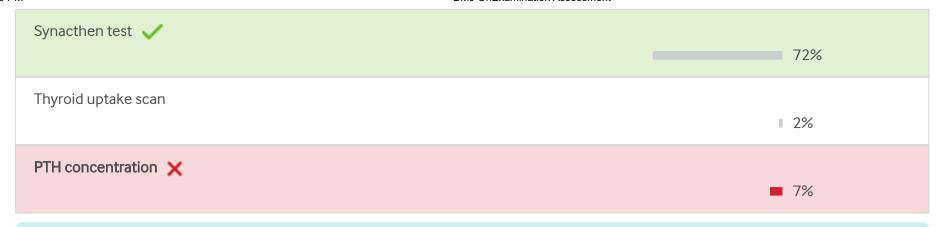
Investigations reveal:

Serum sodium	128 mmol/L	(137-144)
Serum potassium	5.2 mmol/L	(3.5-4.9)
Serum urea	7.8 mmol/L	(2.5-7.5)
Serum creatinine	110 μmol/L	(60-110)
Serum glucose	11.6 mmol/L	(3.0-6.0)
HbA _{1c}	79 mmol/mol	(20-42)
	9.4%	(3.8-6.4)
Serum calcium	2.95 mmol/L	(2.2-2.6)
Serum phosphate	0.8 mmol/L	(0.8-1.4)
Serum free T4	8.2 pmol/L	(10-22)
Serum TSH	5.2 mU/L	(0.4-5.0)
Serum oestradiol	80 pmol/L	(130-850)
Serum LH	4.4 mU/L	(2-10)
Serum FSH	2.2 mU/L	(2-10)
Serum prolactin	400 mU/L	(50-450)

Which of the following is the most appropriate investigation for this patient?

Pregnancy test	■ 3%
Pituitary CT scan	17%

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Diabetes, Endocrinology

• Adrenal insufficiency in combination with T1 DM +/- premature ovarian failure is Schmidt's disease (tpe 2 autoimmune polyendocrine syndrome)

Explanation

This patient with type 1 diabetes has developed deterioration in glycaemic control (although improvement in glucose control can also be seen in adrenal insufficiency resulting in hypoglycaemic attacks), nausea and weight loss.

Investigations reveal:

- Hyponatraemia
- Hypercalcaemia
- Low thyroxine (T4)
- Raised thyroid-stimulating hormone (TSH), and
- Hypogonadotrophic hypogonadism (in part secondary to weight loss).

This all fits with a diagnosis of primary hypoadrenalism.

The patient is not pregnant as oestradiol concentrations would be elevated.

Although the low oestrogen with normal luteinising hormone (LH)/follicle-stimulating hormone (FSH) suggest a pituitary problem, these are typical of severe hypoadrenalism (and low body weight) and should respond to steroid replacement therapy. Low T4 concentrations and slightly elevated TSH can occur in primary hypoadrenalism and should also respond to steroid replacement.

It is important not to replace with thyroxine in these circumstances unless adrenal insufficiency has been eliminated, as this can induce acute adrenal insufficiency (due to increased metabolism induced by thyroxine replacement).

A pituitary problem is unlikely to be responsible for this picture as the prolactin concentration is normal nad she already has an autoimmune disorder (T1DM).

T1DM and Addison's disease are features of Schmidt's disease (type 2 autoimmune polyendocrine syndrome).

Primary ovarian failure is also associated with this condition (where LH and FSH would be high), but this patient appears not to have developed this as yet.

If the TSH and T4 do not normalise with steroid replacement, the thyroid can be tested further (for example, for thyroid autoantibodies).

Next question

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English French

Question 16 of 121

☆ High impact question

A 45-year-old female presents with depression, constipation, polyuria and thirst.

Over the last six months she has become increasingly aware of tiredness and arthralgia since being diagnosed with hypertension and has been treated with bendroflumethiazide 2.5 mg daily. Physical examination proves to be entirely normal except for a blood pressure of 162/94 mmHg.

Investigations show:

Haemoglobin	144 g/L	(115-165)
White cell count	7.1 ×10 ⁹ /L	(4-11)
Platelets	200 ×10 ⁹ /L	(150-400)
Serum sodium	148 mmol/L	(137-144)
Serum potassium	4.2 mmol/L	(3.5-4.9)
Serum chloride	105 mmol/L	(95-107)
Serum bicarbonate	28 mmol/L	(20-28)
Serum urea	8 mmol/L	(2.5-7.5)
Serum creatinine	105 μmol/L	(60-110)
Serum corrected calcium	3.14 mmol/L	(2.2-2.6)
Serum bilirubin	16 μmol/L	(1-22)
Serum alanine aminotransferase	10 U/L	(5-35)
Serum aspartate aminotransferase	17 U/L	(1-31)
Serum alkaline phosphatase	130 U/L	(45-105)
Plasma parathyroid hormone	17 pmol/L	(0.9-5.4)

Which of the following is the most appropriate initial therapy?

- Steroids
- O Pamidronate
- O Intravenous normal saline
- Furosemide
- Calcitonin

Answer question

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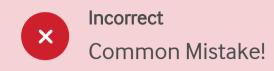
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English French



☆ High impact question

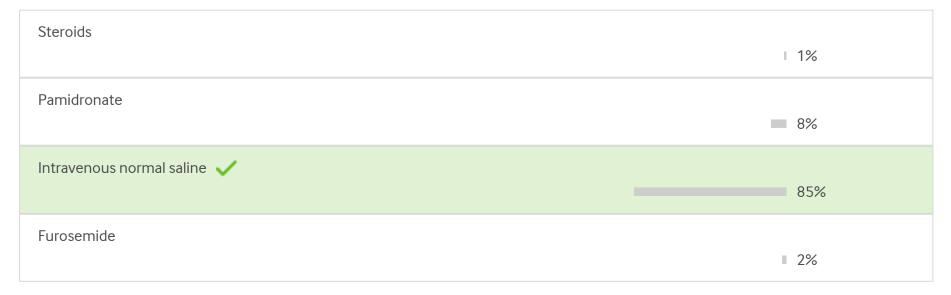
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Serum potassium	4.2 mmol/L	(3.5-4.9)
Serum chloride	105 mmol/L	(95-107)
Serum bicarbonate	28 mmol/L	(20-28)
Serum urea	8 mmol/L	(2.5-7.5)
Serum creatinine	105 μmol/L	(60-110)
Serum corrected calcium	3.14 mmol/L	(2.2-2.6)
Serum bilirubin	16 μmol/L	(1-22)
Serum alanine aminotransferase	10 U/L	(5-35)
Serum aspartate aminotransferase	17 U/L	(1-31)
Serum alkaline phosphatase	130 U/L	(45-105)
Plasma parathyroid hormone	17 pmol/L	(0.9-5.4)

Which of the following is the most appropriate initial therapy?





Key learning points 🛭



Endocrinology

• Hypercalcaemia is initially treated with rehydration, IV normal saline

Explanation

This patient has <u>primary hyperparathyroidism</u> and the hypercalcaemia should initially be treated with intravenous normal saline.

She is dehydrated and requires appropriate fluid replacement. Once corrected the patient could then be offered surgery as the most appropriate therapeutic option.

Calcitonin is reserved for severe hypercalcaemia and the effects tend to be transient.

Pamidronate is effective at reducing calcium over a couple of days but it is important first to ensure that the patient is adequately hydrated.

Steroids are effective in certain types of hypercalcaemia - sarcoid - but ineffective in primary hyperparathyroidism.

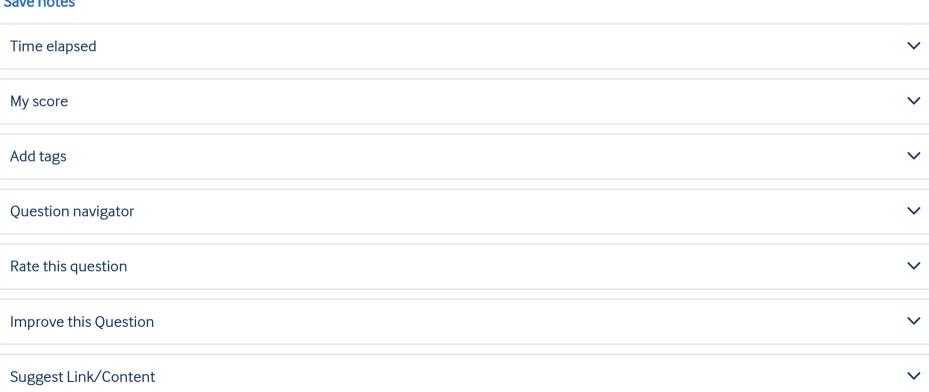
Furosemide is often used to induce a hypercalciuria in severe hypercalcaemia once the patient has been adequately rehydrated.

Next question

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Question 17 of 121

A 33-year-old male presents with anxiety attacks and palpitations associated with hypertension.

As part of screening for secondary hypertension he is noted to have repeatedly high urinary catecholamine concentrations.

He is an intermittent smoker of 10 cigarettes per week and drinks approximately 18 units of alcohol weekly.

He has been otherwise quite well. He is adopted and no family history is available.

He is referred to the local endocrine department where elevated urine catecholamine concentrations are noted and CT scan of his abdomen reveals bilateral adrenal masses of 4 cm diameter.

Amongst other investigations an elevated plasma calcitonin concentration is noted.

What other abnormality is likely to be present in this patient?

- Pituitary adenomaCerebellar haemangiomaParathyroid hyperplasiaVIPoma
- Neurofibromas

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As part of screening for secondary hypertension he is noted to have repeatedly high urinary catecholamine concentrations.

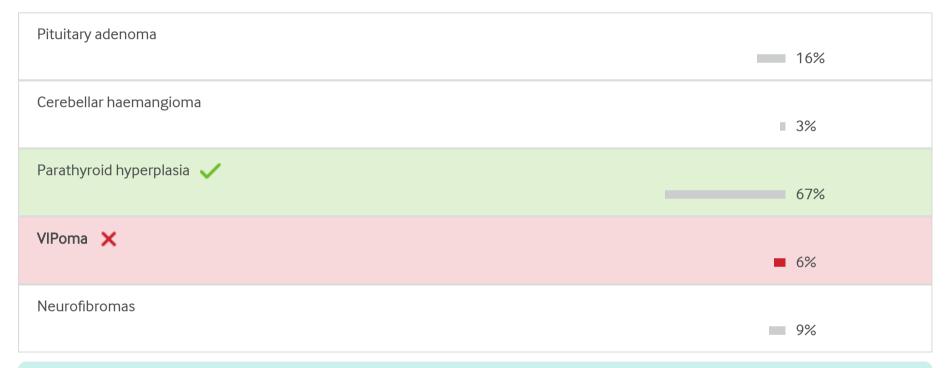
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Amongst other investigations an elevated plasma calcitonin concentration is noted.

What other abnormality is likely to be present in this patient?



Key learning points 🛛



Endocrinology, Genetics

• MEN 2 is made up of phaeochromocytoma, medullary thyroid carcinoma and parathyroid hyperplasia

Explanation

This patient has bilateral phaeochromocytomas and elevated plasma calcitonin concentration suggesting a medullary thyroid cancer and so implying a diagnosis of multiple endocrine neoplasia (MEN) type 2.

The missing piece of the triad for MEN type 2 is hyperparathyroidism which is a likely finding in this patient.

MEN type 2 is an autosomal dominant condition although many presentations are sporadic; it has been mapped to chromosome 10 and is associated with the presence of the RET proto-oncogene.

There are three different types - 2A, 2B and familial medullary thyroid carcinoma, of which 2A is more common and may be distinguished from 2B which is associated with musculoskeletal abnormalities including marfanoid habitus and ganglioneuromas.

In our particular case there was no mention of any abnormalities on examination to suggest mucosal/truncal neurofibromas.

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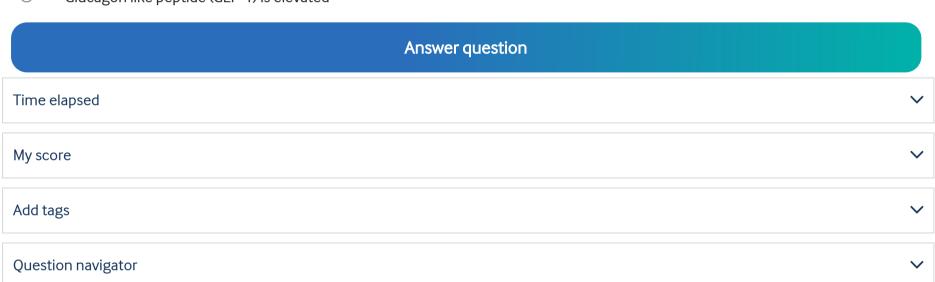
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Question 18 of 121

An 18-year-old man with new onset type 1 diabetes for which he began insulin therapy some 6 weeks earlier, comes to the clinic for review. He wants to be considered for a metabolic intervention study, and entry criteria are tied to the incretin response to a mixed meal test. Clinical examination is entirely unremarkable.

Which of the following is true of the incretin response in this case vs non-diabetic individuals?

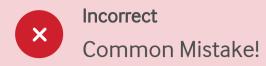
- O Glucagon like peptide (GLP-2) is elevated
- O Glucagon is elevated
- O Peptide tyrosine tyrosine (PYY) is elevated
- O Gastric inhibitory peptide (GIP) is elevated
- O Glucagon like peptide (GLP-1) is elevated



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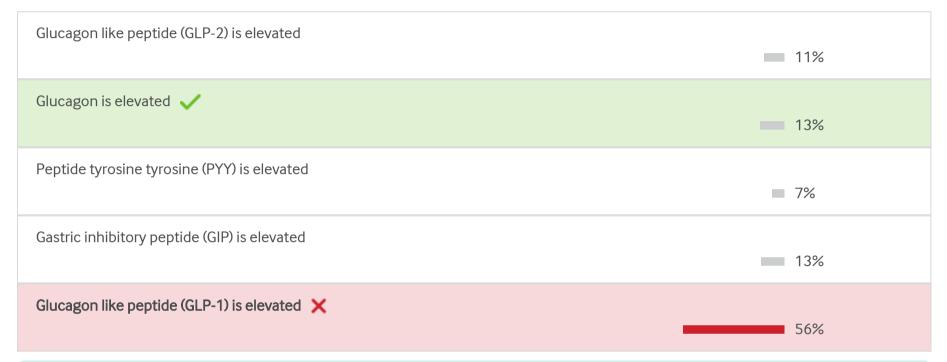
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Which of the following is true of the incretin response in this case vs non-diabetic individuals?



Key learning points 🛭



Endocrinology

• Glucagon response to the mixed meal test is significantly disordered in patients with new onset Type 1 diabetes.

Explanation

In new onset type 1 diabetes, a paradoxical incretin response to mixed meal testing is seen, where a rise in glucagon occurs. Elevated glucagon and consequent gluconeogenesis and glycogenolysis is thought to drive further negative impact on remaining beta cells, accelerating their demise, and for this reason trials of GLP-1 agonists in Type 1 diabetes are underway [1].

GIP is primarily thought to be responsible for the second phase insulin response and is not elevated in type 1 diabetes. GLP-1 is suppressed, and GLP-2 is an intestinal growth factor which is now available as a treatment for short bowel syndrome and for recovery post cancer chemotherapy. PYY levels are not significantly altered versus other incretins such as GLP-1 and glucagon in type 1 diabetes.

References:

1. <u>Time course of pancreatic islet dysfunction in new-onset type 1 diabetes</u>

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BMJ On Exam

English French

Question 19 of 121

A 26-year-old female presents with a three month history of weight loss and general lethargy.

She has a five year history of Type 1 diabetes for which she has been treated with basal bolus insulin consisting of short acting insulin thrice daily and long acting insulin in the evenings.

Commensurate with her weight loss of 5 kg over the last three months she has noticed that she has recently encountered more hypoglycaemic events and has reduced her insulin requirements from 60 units per day to 38 units daily.

She takes no medication other than the oral contraceptive pill. She is a non-smoker and denies use of any illicit substances.

On examination she has a BMI of 21.2 kg/m^2 and appears comfortable. Her pulse is 68 beats per minute regular and her blood pressure is 118/70 mmHg. There are no specific abnormalities of the chest, heart or abdomen but she has a slight purplish-yellow, non-tender 2-3 cm well circumscribed papules on both shins.

Investigations reveal:

Urinalysis	Normal	-
Haemglobin	12.1 g/dL	(11.5-16.5)
White cell Count	5 ×10 ⁹ /L	(4-11)
Random glucose	10.2 mmol/L	(<11.1)
HbA _{1c}	50 mmol/mol	(20-46)
	6.7%	(3.8-6.4)
Plasma Sodium	135 mmol/L	(137-144)
Plasma Potassium	4.5 mmol/L	(3.5-4.9)
Plasma Urea	5 mmol/L	(2.5-7.5)

Which of the following is the most appropriate investigation for this patient?

- Synacthen test
- O Abdominal ultrasound scan
- O Anti-endomysial antibodies
- Thyroid function tests
- O Barium meal with follow through

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Plasma Sodium	135 mmol/L	(137-144)
Plasma Potassium	4.5 mmol/L	(3.5-4.9)
Plasma Urea	5 mmol/L	(2.5-7.5)

Which of the following is the most appropriate investigation for this patient?

Synacthen test 🗸	41%
Abdominal ultrasound scan	7 %
Anti-endomysial antibodies	23%
Thyroid function tests	27%
Barium meal with follow through 🗶	■ 2%

Key learning points 🛭

9/10/24, 1:36 PM BMJ OnExamination Assessment

Diabetes, Endocrinology

• Reducing insulin requirements, weight loss and hypoglycaemia should alert you to autoimmune hypoadrenalism if found in a type 1 diabetic

Explanation

The salient features in this young woman with <u>type 1 diabetes</u> is the weight loss, lethargy and reduced insulin requirements with increasing frequency of hypoglycaemic events.

The latter in particular points to a general increase in insulin sensitivity and with her history of autoimmune disease (type 1 diabetes), hypoadrenalism should be considered as the cause.

Hence, a short Synacthen test is the most appropriate diagnostic test.

Hypothyroidism would cause weight gain.

Hyperthyroidism may be expected to increase insulin requirements and have typical signs tachycardia for instance, fine tremor, etc.

There are no symptoms to suggest inflammatory bowel disease.

The rash on the shins is typical of necrobiosis rather than indicating pyoderma.

<u>Coeliac disease</u> would not be expected to have this impact on insulin requirements; an anaemia may be expected and for this diagnosis there should be a hint of some other features.

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English French

Question 20 of 121

A 16-year-old boy was seen in the Emergency department with a three day history of nausea and vomiting.

He had a 12 year history of insulin-dependent diabetes mellitus. Over the past three years he had been less attentive to his glycaemic control and been admitted on several occasions in diabetic ketoacidosis.

On examination he was alert and oriented. His mouth was dry but there was no loss of skin turgor. Examination was otherwise unremarkable.

Investigations revealed:

Hb	159 g/L	(130-180)
WBC	12.1 ×10 ⁹ /L	(4-11)
Platelets	450 ×10 ⁹ /L	(150-400)
Sodium	135 mmol/L	(137-144)
Potassium	4.9 mmol/L	(3.5-4.9)
Urea	9.9 mmol/L	(2.5-7.5)
Creatinine	160 μmol/L	(60-110)
Bicarbonate	17 mmol/L	(20-28)
Glucose	28.4 mmol/L	(3.0-6.0)

Urinalysis protein trace.

Ketones+++

Glucose 2%

He was treated with intravenous fluids and with an intravenous insulin sliding scale and his symptoms improved within 24 hours. After 36 hours he had good glycaemic control and was able to eat and drink without feeling nauseated. However, when the intravenous fluids were discontinued, the nausea and vomiting resumed. The intravenous fluids were continued but abnormalities in his blood biochemistry became apparent.

Seven days after admission to hospital his biochemistry results showed:

Sodium 115 mmol/L (137-144)

Potassium 7.2 mmol/L (3.5-4.9)

Urea 12.4 mmol/L (2.5-7.5)

Bicarbonate 14 mmol/L (20-28)

What single test would be best to determine the cause of these biochemical abnormalities?

- Serum amylase
- Adrenal autoantibodies
- O Tetracosactrin (Synacthen) test
- O Serum ACTH
- O 24 hour urinary electrolytes

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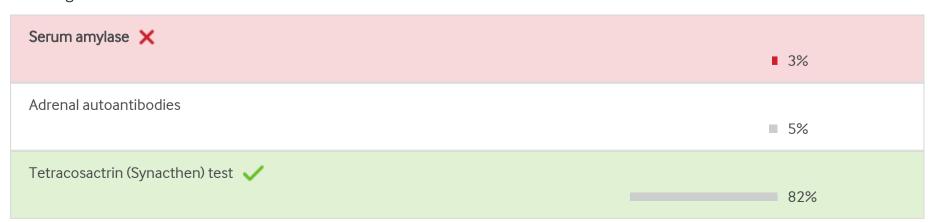
Sodium 115 mmol/L (137-144)

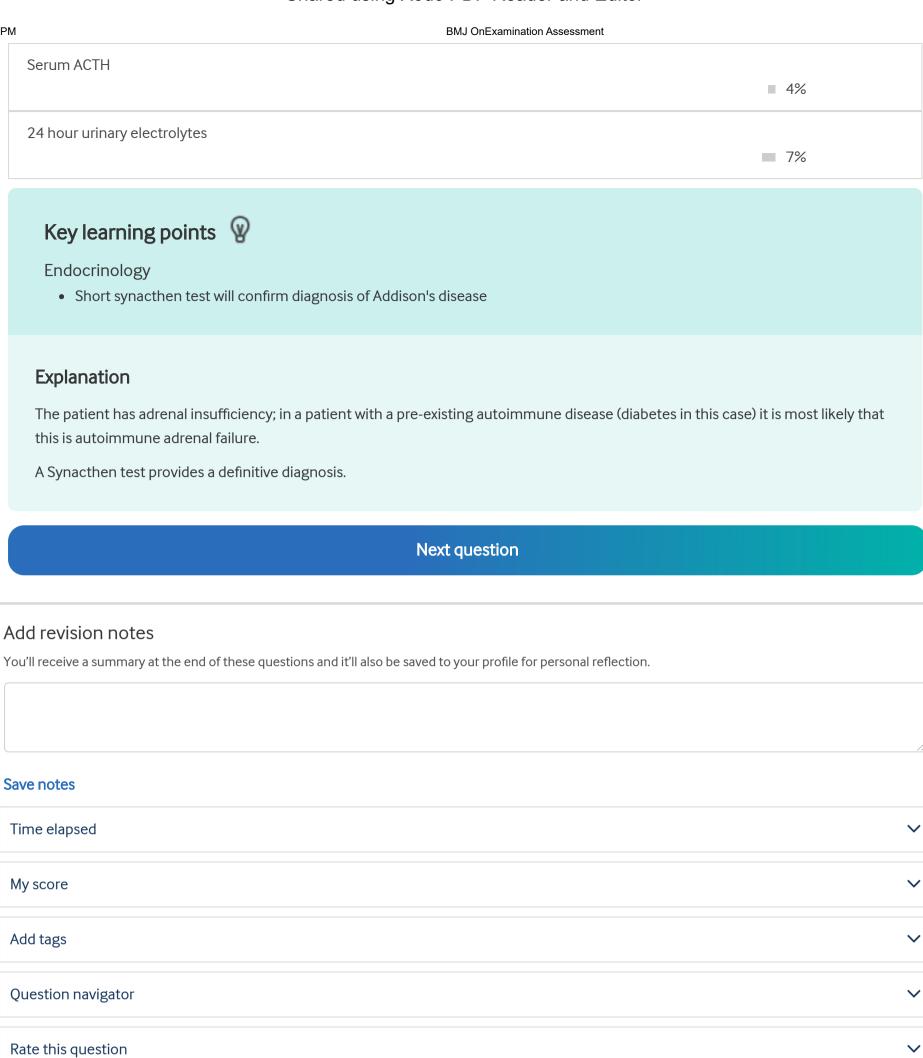
Potassium 7.2 mmol/L (3.5-4.9)

Urea 12.4 mmol/L (2.5-7.5)

Bicarbonate 14 mmol/L (20-28)

What single test would be best to determine the cause of these biochemical abnormalities?





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English French

Question 21 of 121

A 62-year-old male is referred with impotence.

He was diagnosed with diabetes mellitus 10 years ago and was initially treated with diet but has required metformin over the last three years. Over the last two years he has been aware of deteriorating erectile dysfunction and is now totally impotent. He shaves daily and has not been aware of any change in body hair. He is a non-smoker and drinks approximately ten units of alcohol weekly.

Examination reveals an obese male with a blood pressure of 146/88 mmHg, and normal secondary sexual characteristics. Testicular examination reveals normal testes of approximately 15 ml in volume. There are no abnormalities on cardiovascular, respiratory or abdominal examinations.

Investigations reveal:

Haemoglobin	142 g/L	(130-180)
White cell count	9.0 ×10 ⁹ /L	(4-11)
Platelets	188 ×10 ⁹ /L	(150-400)
Serum sodium	145 mmol/L	(137-144)
Serum potassium	4.5 mmol/L	(3.5-4.9)
Serum urea	7.2 mmol/L	(2.5-7.5)
Serum creatinine	110 μmol/L	(60-110)
Serum alkaline phosphatase	88 U/L	(45-105)
Serum aspartate aminotransferase	30 U/L	(1-31)
Serum gamma GT	42 U/L	(<50)
HbA _{1c}	7.8%	(3.8-6.4)
Fasting plasma glucose	7.8 mmol/L	(3.0-6.0)
Plasma testosterone	7.1 nmol/L	(9-33)
Plasma FSH	4.1 mU/L	(3-12)
Plasma luteinising hormone	5.1 mU/L	(3-10)

Which of the following would you select as further investigation of this patient?

\circ	Ultrasound testes
\circ	Oestradiol concentration
0	Penile Doppler studies
\circ	Prolactin concentration

Ferritin

 \bigcirc

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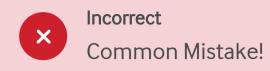
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English French



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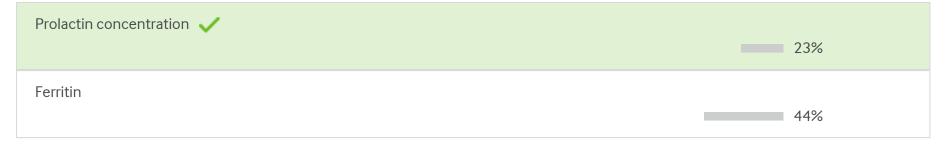
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Investigations reveal:

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Serum sodium	145 mmol/L	(137-144)
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Fasting plasma glucose	7.8 mmol/L	(3.0-6.0)
Plasma testosterone	7.1 nmol/L	(9-33)
Plasma FSH	4.1 mU/L	(3-12)
Plasma luteinising hormone	5.1 mU/L	(3-10)

Which of the following would you select as further investigation of this patient?





Key learning points 🛭

Endocrinology

• Hypogonadotrophic hypogonadism is common in obesity and diabetes, but sinister causes should be excluded.

Explanation

This patient has hypogonadotrophic hypogonadism (HH) with *inappropriately* normal luteinising hormone/follicle-stimulating hormone (LH/FSH) for the low testosterone concentrations.

HH is a relatively common scenario associated with type 2 diabetes and obesity. The exact mechanism responsible is unknown.

<u>Haemochromatosis</u> seems unlikely in the absence of suggestive symptoms and signs (arthritis, pigmentation, hepatomegaly, deranged liver function tests).

Hyperprolactinaemia may be associated with a HH and signs such as galactorrhoea may be present. This should be excluded. A measure of free testosterone may also be warranted as total can be low due to SHBG being decreased in obesity and with ageing.

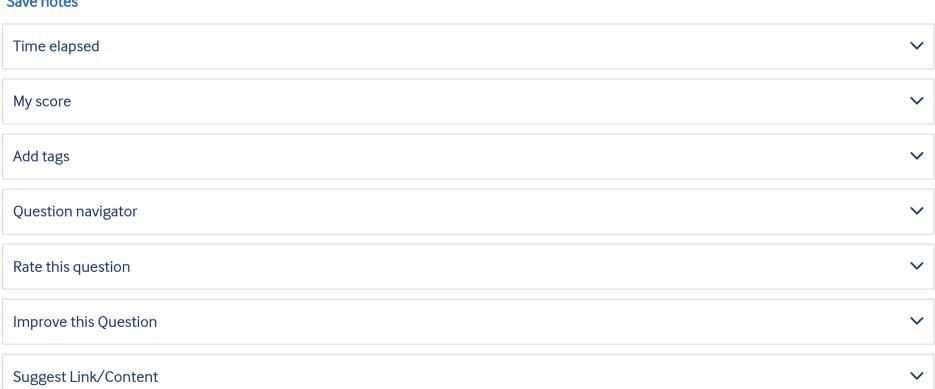
If the HH is confirmed then pituitary MRI would be the best imaging technique to exclude other pituitary pathology.

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Question 22 of 121

☆ High impact question

A 32-year-old male presents to the rheumatology clinic with stiffness and deformity of the small joints of the hands which has developed over the last 12 months.

The hands have become increasingly stiff and awkward particularly as the day progresses and he has had trouble straightening the medial fingers of the right hand. He has been diagnosed with type 1 diabetes mellitus for the last 11 years and has been treated with twice daily insulin. He has undergone laser treatment to the left eye. Currently, he is receiving 60 units of mixed insulin daily and also is treated with ramipril 10 mg daily.

On examination, the appearances of the hands are shown with the patient asked to oppose the hands together.



What is the diagnosis?

- Cheiroarthropathy
- Secondary hyperparathyroidism
- O Dupuytren's contracture
- O Reflex sympathetic dystrophy
- Scleroderma

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BMJ On Exam

English French



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On examination, the appearances of the hands are shown with the patient asked to oppose the hands together.



What is the diagnosis?

Cheiroarthropathy	41%
Secondary hyperparathyroidism 🗶	■ 2%
Dupuytren's contracture	40%
Reflex sympathetic dystrophy	9%
Scleroderma	1 7%

Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• Cheiroarthropathy causes skin tightening in the hands resulting in contracture of the fingers

Explanation

Diabetic cheiroarthropathy is a condition of limited joint mobility that occurs in subjects with diabetes.

Cheiroarthropathy is characterised by thickening of the skin resulting in contracture of the fingers. Cheiroarthropathy causes such limited motion of the fingers that the affected individual is unable to extend the fingers to flatten the hand fully. Typically both hands are affected by cheiroarthropathy.

Cheiroarthropathy has been reported in over half of patients with insulin-dependent diabetes and approximately three quarters of those with non-insulin-dependent diabetes.

Cheiroarthropathy occurs more frequently in those with a longer history of diabetes.

Treatment of cheiroarthropathy includes pain relief and/or anti-inflammatory drugs, physiotherapy and tight glycaemic control.

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English French

Question 23 of 121

A 32-year-old man with a 25 year history of type 1 diabetes comes to the Emergency Department for review. He has been feeling increasingly unwell with nausea and vomiting for the past 48 hours. He takes a basal bolus insulin regimen, and his overall glycaemic control had been poor until he began treatment with canagliflozin to smooth out blood glucose fluctuations.

Since then he has progressively reduced his insulin dose in total by approximately 40%. On examination his BP is 100/70, pulse is 85 and regular. His temperature is 38.1°C. He looks dehydrated. Chest appears clear on auscultation, abdomen is soft although he is mildly tender, particularly in the epigastrium.

Investigations:

НЬ	137 g/l	(135-180)
WCC	13.2x10(9)/I	(3.8-10.8)
PLT	302x10(9)/I	(150-450)
Na	142 mmol/l	(135-145)
K	3.7 mmol/l	(3.5-5.5)
Bicarbonate	12 mmol/l	(18-28)
Cr	145 micromol/l	(60-110)
Lactate	3.9 mmol/l	(1.0-1.8)
Glucose	11.2 mmol/l	(<7.0)

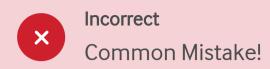
Which of the following is the most likely diagnosis?

- O Hyperosmolar non-ketotic state
- O Diabetic ketoacidosis
- Tissue hypoxia/hypoperfusion
- Starvation ketosis
- Lactic acidosis related to SGLT-2 inhibition

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English French



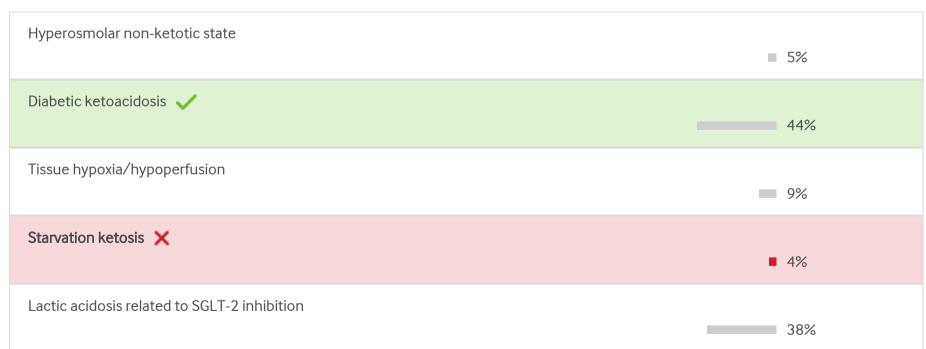
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K	3.7 mmol/l	(3.5-5.5)
Bicarbonate	12 mmol/l	(18-28)
Cr	145 micromol/l	(60-110)
Lactate	3.9 mmol/l	(1.0-1.8)
Glucose	11.2 mmol/l	(<7.0)

Which of the following is the most likely diagnosis?



Diabetes, Endocrinology

• Diabetic ketoacidosis is increasingly recognised in patents with type 1 diabetes who are prescribed an SGLT-2 inhibitor.

Explanation

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The answer is diabetic ketoacidosis. This condition is increasingly recognised in patents with type 1 diabetes who are prescribed an SGLT-2 inhibitor. In a randomised controlled trial rates of ketoacidosis related AEs were as high as 9% in patients prescribed canagliflozin 300 mg. Ketoacidosis is thought to occur with increasing frequency because patients down titrate their insulin dose inappropriately, and in effect both lose glucose into the urine and do not have enough insulin to meet their glucose metabolism needs.

For this reason, insulin dose reduction in patients with type 1 diabetes taking an SGLT-2 inhibitor should only be carried out with specialist advice, and off label, use isn't widely recommended.

Hyperosmolar non-ketotic state is incorrect, given we have evidence of elevated lactate and metabolic acidosis, and the rise in blood glucose is very modest. The acidosis is not related to SGLT-2 inhibition directly, but due to down titration of insulin dosing, hence this is not lactic acidosis related directly to SGLT-2 inhibition. The ketosis is not due to starvation, but glycosuria does create a relative calorie deficit.

Acidosis is seen in the context of tissue hypoxia/hypoperfusion, but usually in the context of a profound hypotensive episode.

References:

<u>Diabetic Ketoacidosis</u> With Canagliflozin, a Sodium-Glucose Cotransporter 2 Inhibitor, in Patients With Type 1 Diabetes

<u>Euglycemic Diabetic Ketoacidosis: A Predictable, Detectable, and Preventable Safety Concern With SGLT2 Inhibitors</u>

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English French

Question 24 of 121

This 45-year old man is referred by his GP with a six month history of weight gain, thirst and weakness.

His appearance is as shown, he has a blood pressure of 176/82 mmHg and is noted to have some difficulty rising from a squatting position.

Of relevance, his GP encloses results showing a random glucose concentration of 9.0 mmol/L and serum creatinine of 220 µmol/L.



Which would be the most appropriate diagnostic investigation for this patient?

- O 24 hour urinary catecholamines
- O 24 hour urinary free cortisol
- Overnight dexamethasone suppression test (ODST)
- O Femoral nerve conduction studies
- Oral glucose tolerance test (OGTT)

Answer question

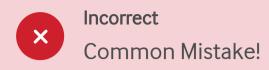
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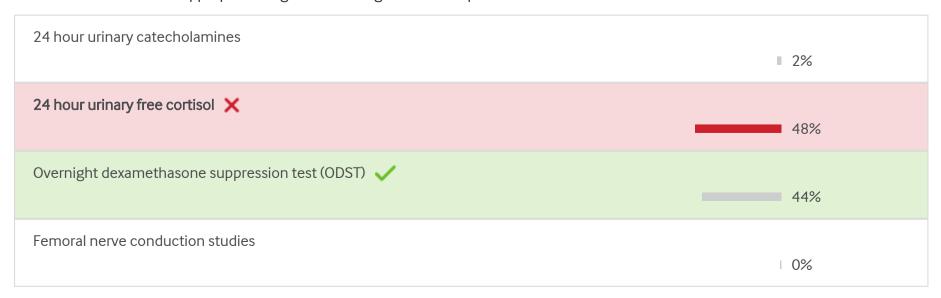
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Of relevance, his GP encloses results showing a random glucose concentration of 9.0 mmol/L and serum creatinine of 220 μ mol/L.



Which would be the most appropriate diagnostic investigation for this patient?



Oral glucose tolerance test (OGTT) 6%

Key learning points **Q**



Endocrinology, Photographic

• Failure to suppress cortisol below 50 nmol/L on a ODST test is highly suggestive of Cushing's disease

Explanation

This is a tough but excellent and highly discriminatory question.

This patient has features of Cushing's syndrome with the photo revealing this central adiposity, plethoric complexion, thin arms and legs and bruising on the arms.

He also has a proximal myopathy (difficulty standing), hypertension and probably has diabetes.

Although the random glucose is not diagnostic of diabetes, it really is irrelevent to endeavour to diagnose diabetes with an OGTT or fasting glucose when what we are asked to do is diagnose this patient's underlying condition - Cushing's.

Although a urine free cortisol would be the best screening test in this patient whose renal function is poor, this test is more likely to give a false negative than an overnight dexamethasone suppression test.

Therefore, the most appropriate test in these circumstances would be an overnight dexamethasone suppression test (ODST).

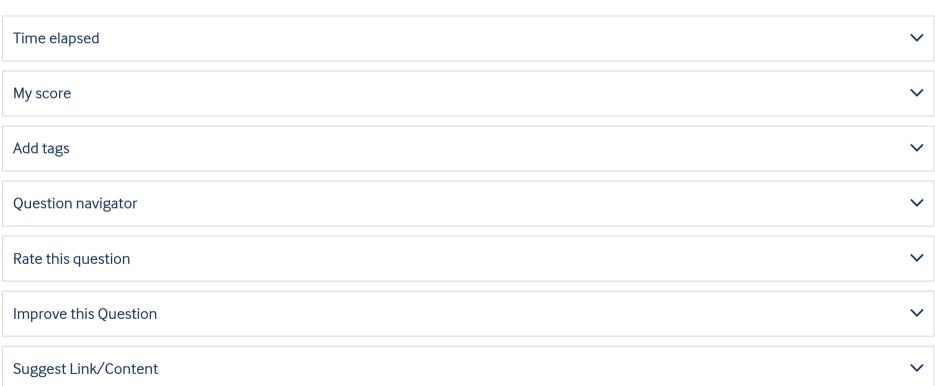
Failure to suppress cortisol below 50 nmol/L on this test is highly suggestive of Cushing's with ~95% sensitivity and specificity.

Next question

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Question 25 of 121

A 36-year-old female presents with thirst and frequency of micturition.

These symptoms have deteriorated over the last three months and she is now aware of twice nightly nocturia and occasionally needs to drink during the night. She has been aware of intermittent frontal headaches over this time which are generally relieved by paracetamol and are without any relationship to the time of day.

She has been rather stressed of late since the break up of her marriage six months ago. Since the separation she has been taking fluoxetine 20 mg daily. No abnormalities are detected upon examination.

She undergoes an eight hour water deprivation test which reveals the following:

Time	Weight (kg)	Plasma osm	Urine osm	Urine vol (ml)
8 am	66.5	285	-	-
9 am	-	-	110	200
10 am	-	-	200	290
11 am	-	-	240	220
12 midday	66	300	290	200
1 pm	-	-	310	200
2 pm	-	-	320	202
3 pm	-	-	-	150
4 pm	65.2	304	340	156
DDAVP 1 microgram SC given at 4 pm and permitted to drink				
6 pm	66.4	290	810	15
What is the di	agnosis?			

- Primary polydipsia
- \bigcirc Central diabetes insipidus
- \bigcirc Nephrogenic diabetes insipidus
- \bigcirc Normal response
- \bigcirc Fluoxetine induced diabetes insipidus (DI)

Answer question Time elapsed My score

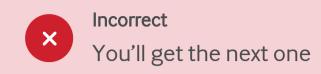
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1 pm	-	-	310	200
2 pm	-	-	320	202
3 pm	-	-	-	150
4 pm	65.2	304	340	156
DDAVP 1 microgram SC given at 4 pm and permitted to drink				
6 pm	66.4	290	810	15

What is the diagnosis?



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Endocrinology

• Inability to concentrate urine during the water deprivation test, which improves with DDAVP is central DI

Explanation

This patient has developed haemoconcentration following eight hours of dehydration but although it has begun to concentrate her urine this is inadequate and constitutes complete DI.

She responds well to the DDAVP indicating that she has central DI rather than nephrogenic DI.

Fluoxetine does not cause DI but is not infrequently associated with <u>syndrome of inappropriate antidiuretic hormone</u> (SIADH).

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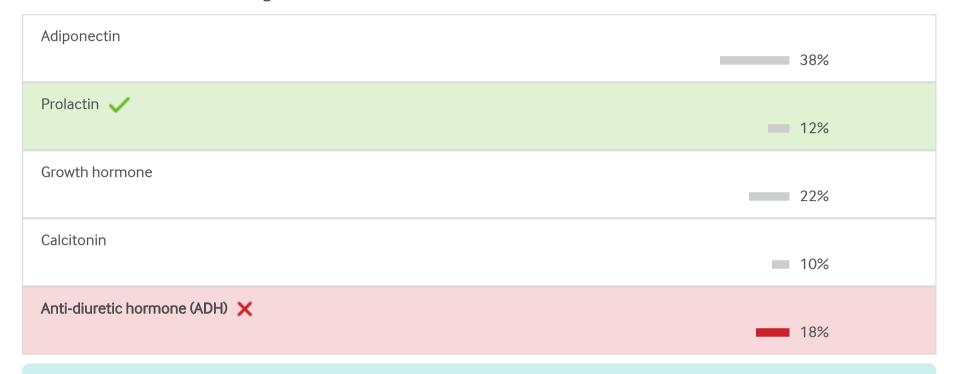
English French Question 26 of 121 Which hormone has a role in fetal lung maturation? Adiponectin \bigcirc \bigcirc Prolactin \bigcirc Growth hormone \bigcirc Calcitonin \bigcirc Anti-diuretic hormone (ADH) Answer question Time elapsed My score Add tags Question navigator

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English French



Which hormone has a role in fetal lung maturation?



Key learning points 🛭



• Pituitary hormones; prolactin.

Explanation

Prolactin is important for development of the fetal lung in addition to its well-known role in lactation and breast development during pregnancy. The process of fetal lung maturation is poorly understood, but may also involve cortisol.

In adult medicine, prolactin is mostly associated with disorders of reproduction. Women with hyperprolactinaemia have galactorrhoea, menstrual disturbance, anovulatory cycles and reduced fertility. Significant increases in prolactin tend to present earlier in females than in males.

Hyperprolactinaemia in men can present with oligospermia and impotence. If due to a pituitary macroadenoma, visual disturbance may be a feature due to compression of the optic chiasm.

Prolactin is secreted under the control of dopamine. Dopamine inhibits release of prolactin. When a pituitary macroadenoma becomes large enough to compress the pituitary stalk, the normal tonic inhibition of prolactin secretion by dopamine is reduced, causing elevated prolactin concentrations in the blood.

Many medications also cause elevated prolactin, including:

- Phenothiazide
- Metoclopramide
- Reserpine
- Oestrogens
- Cimetidine, and
- Tricyclic antidepressants.

Most of these work by altering dopamine metabolism, thus reducing its tonic inhibitory control over prolactin.

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Question 27 of 121

★ High impact question

A 70-year-old female is admitted acutely unwell.

Six weeks prior to admission she had presented to the GP with tiredness and weight loss and had been diagnosed with hypothyroidism based on results which showed:

T4 7.8 pmol/L (10-22)

TSH 4 mU/L (0.4-5)

She was treated with thyroxine 100 micrograms daily and has since deteriorated. She has no other past medical history of note, does not smoke and drinks modest quantities of alcohol. She is a widow and is self caring. Her mother had hypothyroidism.

On examination, she is drowsy, thin, has a temperature of 37.5°C, a pulse of 98 beats per minute and a blood pressure of 84/50 mmHg. Cardiovascular, respiratory and abdominal examination are otherwise normal. There are no neurological abnormalities.

The house officer has sent some emergency bloods on this patient.

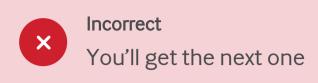
Whilst awaiting the results, what is the most appropriate immediate treatment for this patient?

- O IV Thyroxine (T4)
- O IV Cefotaxime
- O IV Hydrocortisone
- O IV Thyronine (T3)
- O IV 50% Dextrose

Answer question Time elapsed My score Add tags Question navigator

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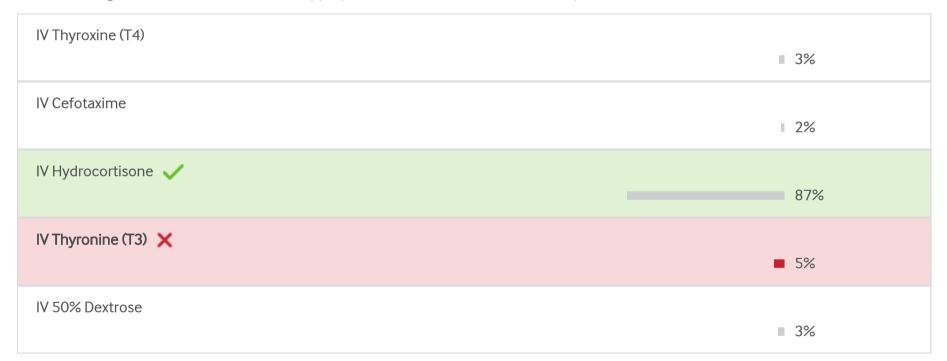
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The house officer has sent some emergency bloods on this patient.

Whilst awaiting the results, what is the most appropriate immediate treatment for this patient?



Endocrinology

• In hypoadrenalism thyroxine can precipitate acute hypoadrenalism

Explanation

The specific features in this case are the past history of weight loss associated with a low T4 but normal thyroid-stimulating hormone (TSH).

The latter would suggest either sick euthyroidism which can be associated with hypoadrenalism or secondary hypothyroidism.

In hypoadrenalism which is either primary or secondary, the addition of thyroxine can precipitate acute hypoadrenalism which appears to be the case here.

The use of IV steroids is therefore lifesaving and should be given without hesitation.

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Question 28 of 121

☆ High impact question

A 45-year-old woman presents to the GP with a neck swelling.

On examination, there is a discrete 2 × 3 cm lump on the left side of the neck which moves with swallowing.

Her thyroid function tests demonstrate:

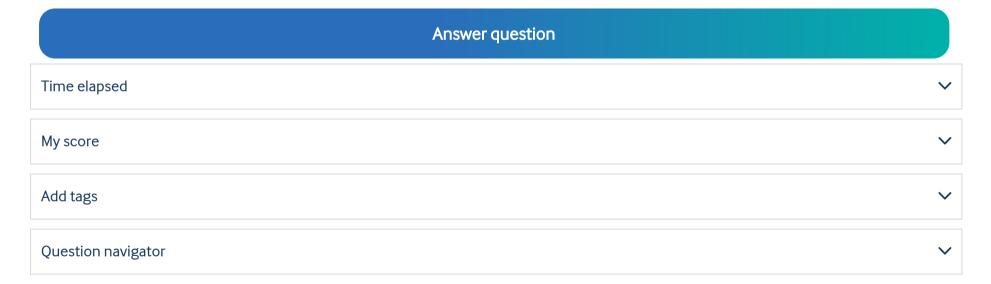
TSH <0.03 IU/L (1.0-5.0)

fT4 28.5 μmol/L (10-15)

fT3 8.0 μmol/L (3.6-5.6)

What is the most likely diagnosis?

- Over-replacement with thyroxine
- O Graves' disease
- O De Quervain's thyroiditis
- Toxic adenoma
- Hashimoto's thyroiditis



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fT4 28.5 μmol/L (10-15)

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What is the most likely diagnosis?



Key learning points 🛭

Endocrinology

• Thyroidal neck swellings can be due to goitre or nodules and can be present in hypothyroid, euthyroid or hyperthyroid states.

Explanation

Thyroidal neck swellings can be due to goitre or nodules and can be present in hypothyroid, euthyroid or hyperthyroid states. Hyperfunctioning solitary adenoma is suggested on the physical finding of a palpable nodule in an otherwise normal gland, as is the case here. Goitres occur either when there is a high level of thyroid-stimulating hormone (TSH) stimulating thyroidal growth or when there is a problem with the production of thyroid hormones, such as occur during iodine deficiency.

Goitres can involve all or part of the gland.

The differential diagnosis of a goitre includes iodine deficiency, Graves' disease, toxic multinodular goitre, and Hashimoto's thyroiditis.

If excessively large, a goitre may cause respiratory difficulties which need urgent attention. Patients with suspected retrosternal extension of a goitre should be considered for urgent imaging and a flow-volume loop.

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Occasionally, a single nodule, or toxic adenoma, can be present which on isotope scanning can be 'hot' (producing T3 and T4) or 'cold'. Hot nodules are rarely malignant but can cause thyrotoxicosis. They generally respond well to surgery or radioiodine treatment. A cold nodule is more concerning as around 20% of cases are malignant. Patients need urgent referral for biopsy.

De Quervain's thyroiditis is typically a self-limited thyroiditis noted for painful enlargement of the thyroid gland in association with fever and hyperthyroidism. Here there is no history of pain.

Grave's disease typically is associated with eye signs and several signs and symptoms not present in this patient. The disease course is often prolonged and there is a family history.

Hashimoto's thyroiditis often is associated with a family history of the condition or having another autoimmune condition. The disease takes some time and to develop and results in an enlarged thyroid initially. Most people develop hypothyroidism rather than hyperthyroidism.

Over-replacement with exogenous hormone typically results in a variable course of hyperthyroidism and is associated with a small thyroid gland.

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Question 29 of 121

A 62-year-old male presents with weight loss, weakness and increasing confusion. He has been diagnosed with small cell carcinoma of the lung four months ago for which he has received chemotherapy.

On examination, he is apyrexial, is disorientated in time and place, has evidence of weight loss but has a BMI of 22.6 kg/m 2 . His blood pressure is 160/98 mmHg with a pulse of 88 bpm. He has weakness of leg extension and has difficulty rising from a seated position and also has shoulder weakness.

His baseline investigations reveal:

Haemoglobin	165 g/L	(130-180)
Sodium	152 mmol/L	(134-144)
Potassium	2.8 mmol/L	(3.5-5.5)
Urea	9.5 mmol/L	(3-8)
Creatinine	158 μmol/L	(50-100)
Glucose	14.1 mmol/L	(3.5-6)
СРК	280 mU/L	(100-250)

What is the most likely diagnosis?

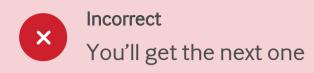
- O Paraneoplastic encephalitis
- O Diabetic amyotrophy
- O Ectopic hormonal secretion
- Dermatomyositis
- O Cerebral metastases

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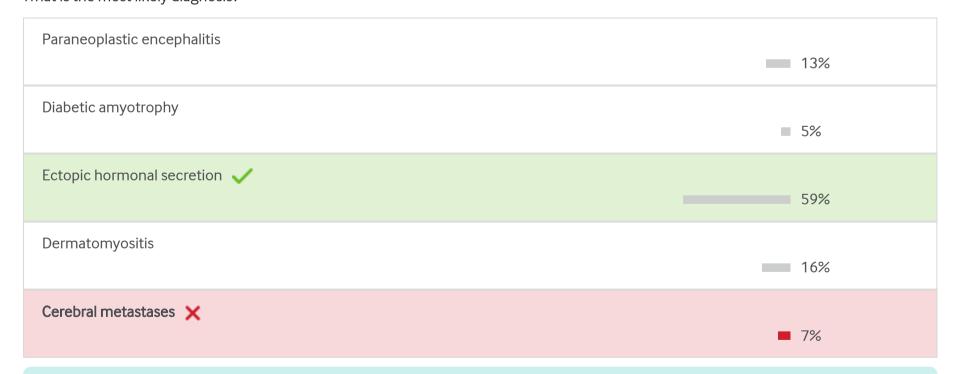
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Creatinine	158 μmol/L	(50-100)
Glucose	14.1 mmol/L	(3.5-6)
СРК	280 mU/L	(100-250)

What is the most likely diagnosis?



Endocrinology, Oncology

• Small cell carcinoma may be associated with ectopic ACTH production, causing Cushing's syndrome

Explanation

This patient has confusion, a proximal myopathy and deranged biochemistry with increased sodium, reduced potassium and hyperglycaemia.

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Of the options provided the most likely diagnosis is ectopic elaboration of adrenocorticotropic hormone (ACTH), that is, ectopic Cushing's syndrome.

Whilst paraneoplastic <u>encephalitis</u> and cerebral metastases may explain the symptoms, they would not explain the deranged biochemistry.

Similarly, diabetic amyotrophy can be a presenting feature of diabetes but confusion and deranged biochemistry are not typical nor would these be explained by dermatomyositis.

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Question 30 of 121

A 69-year-old man is reviewed at medical outpatient clinic complaining of tiredness and neck tenderness. Six months ago he was admitted with angina associated with atrial flutter which spontaneously settled following intravenous digoxin.

Since then he has been treated with amiodarone 200 mg daily. He also takes aspirin 75 mg daily and atenolol 50 mg daily together with pravastatin 40 mg daily. Recent 24 hour ECG shows sinus rhythm throughout with occasional ventricular ectopics.

Examination of the patient reveals a fine tremor, and a pulse of 56 beats per minute with a blood pressure of 146/88 mmHg. Neck examination revealed no obvious goitre but mild tenderness in the thyroid area.

Investigations reveal:

Plasma Free T4 33.1 pmol/L (10-22)

Plasma TSH < 0.02 mU/L (0.4-5)

What is the best management strategy for this patient?

- O Continue amiodarone and start carbimazole
- O Stop amiodarone, start carbimazole and flecainide
- O Stop amiodarone and start steroids
- O Stop amiodarone and start carbimazole
- O Stop amiodarone only



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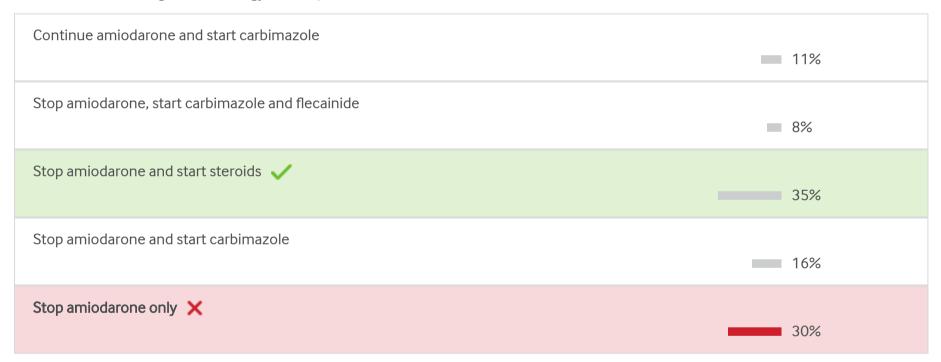
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Investigations reveal:

Plasma Free T4 33.1 pmol/L (10-22)

Plasma TSH < 0.02 mU/L (0.4-5)

What is the best management strategy for this patient?





Endocrinology, Pharmacology

• Amiodarone-induced thyrotoxicosis is due to thyroiditis and can be treated with steroids

Explanation

This patient has probable amiodarone-induced thyrotoxicosis (AIT).

The amiodarone was used to maintain sinus rhythm in this patient who was admitted with ischaemic heart disease and atrial fibrillation/flutter that spontaneously settled. Therefore, the amiodarone should be stopped and if necessary other anti-arrhythmics could be used to maintain sinus rhythm such as sotalol.

However, flecainide would be contraindicated in this patient with ischaemic heart disease.

Amiodarone has a very long plasma half life and stopping this therapy alone would not be sufficient in a patient with a tendency to AF and ischaemic heart disease. Thus to ensure adequate control following withdrawal of amiodarone, the patient should also be commenced on prednisolone (for example, 40 mg) as this is likely to be AIT type 2 (neck tenderness suggests thyroiditis).

In some patients it may not be possible to stop the amiodarone but there must be a strong clinical indication for this such as VT/VF.

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Question 31 of 121

A 64-year-old female presents with a two month history of deteriorating thirst, weight loss and fatigue.

Ten years ago she was treated for breast carcinoma and underwent a right mastectomy and has since been treated with tamoxifen. She also takes bendroflumethiazide 2.5 mg daily for a three year history of hypertension. No specific abnormalities are found on examination, except for a blood pressure of 162/90 mmHg. She has otherwise been well. She takes a large number of vitamins every day.

Her general practitioner arranges a series of biochemical investigations:

Sodium	145 mmol/L	(137-144)
Potassium	3.3 mmol/L	(3.5-4.9)
Urea	9.4 mmol/L	(2.5-7.5)
Creatinine	186 μmol/L	(60-110)
Calcium	3.2 mmol/L	(2.2-2.6)
Phosphate	0.75 mmol/L	(0.8-1.4)
PTH	12 pmol/L	(0.9-5.4)

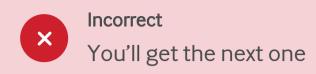
What is the most likely cause of her hypercalcaemia?

- Myeloma
- Primary hyperparathyroidism
- Metastatic bone disease
- O Vitamin D toxicity
- Drug induced

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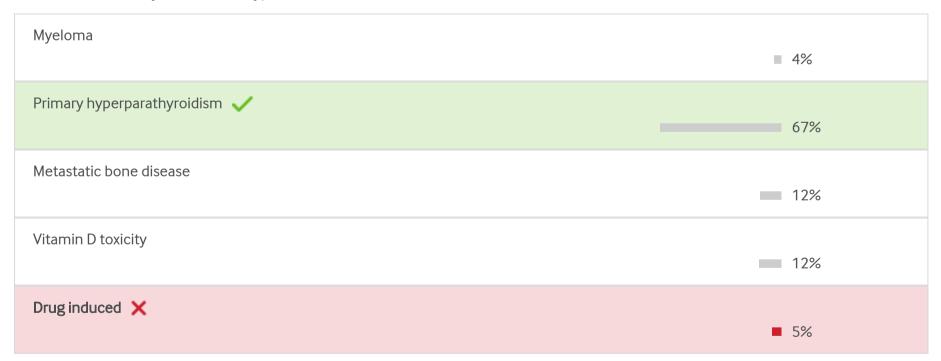
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Creatinine	186 μmol/L	(60-110)
Calcium	3.2 mmol/L	(2.2-2.6)
Phosphate	0.75 mmol/L	(0.8-1.4)
PTH	12 pmol/L	(0.9-5.4)

What is the most likely cause of her hypercalcaemia?



Key learning points 🛭



Endocrinology, Metabolism

• Hypercalcaemia would cause the PTH to be low due to negative feedback so a high calcium and PTH suggests primary hyperparathyroidism

Explanation

This patient has hypercalcaemia associated with elevated parathyroid hormone (PTH) indicating a diagnosis of primary hyperparathyroidism.

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The history of breast Ca is a red herring and the bendroflumethiazide although associated with hypercalcaemia would not cause elevated PTH.

 $\label{thm:problem} \mbox{Vitamin D toxicity would be associated with suppressed PTH.}$

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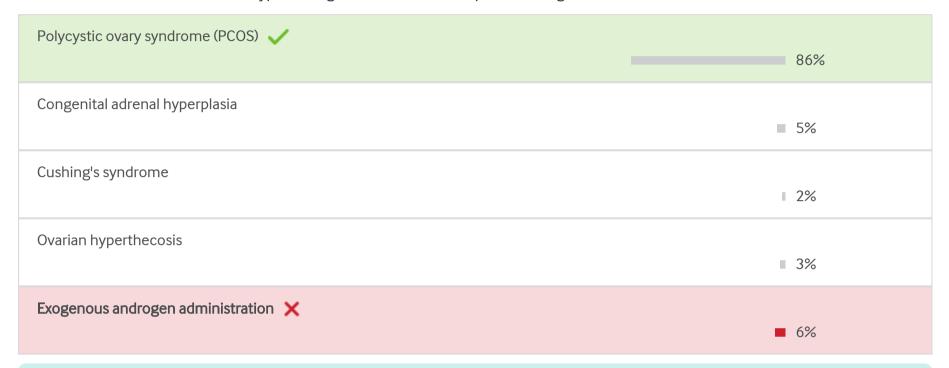
English French Question 32 of 121 What is the most common cause of hyperandrogenism in women of reproductive age? Polycystic ovary syndrome (PCOS) \bigcirc \bigcirc Congenital adrenal hyperplasia Cushing's syndrome \bigcirc \bigcirc Ovarian hyperthecosis Exogenous androgen administration \bigcirc Answer question Time elapsed My score Add tags Question navigator

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English French



What is the most common cause of hyperandrogenism in women of reproductive age?



Key learning points 🛭



Endocrinology

• Gonadal problems; interpretation of gonadotrophins and gonadal hormones.

Explanation

PCOS is the most common cause of hyperandrogenism in women of reproductive age.

The Rotterdam International Consensus Group (2003) described PCOS as a syndrome of ovarian dysfunction, characterised by hyperandrogenism and polycystic ovaries. They recommended that diagnosis be made if two of the following three criteria were met:

- Oligomenorrhoea or anovulation
- Clinical and/or biochemical evidence of hyperandrogenism
- Polycystic ovaries on ultrasonography: multiple peripheral follicles with ovarian volume greater than 10 ml.

Other diseases which can cause similar symptoms, such as androgen secreting tumours, Cushing's syndrome and congenital adrenal hyperplasia must also be excluded.

The typical biochemical profile in PCOS includes mild-moderate elevations in free and total testosterone, elevated dehydroepiandrosterone sulfate (DHEA-S) and low sex hormone-binding globulin (SHBG) concentrations.

In some patients, the luteinising hormone (LH) concentration is elevated while the follicle-stimulating hormone (FSH) concentration remains normal, giving an elevated LH: FSH ratio.

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Question 33 of 121

A 61-year-old man with a history of type 2 diabetes comes to the clinic for review.

He is managed with BD mixed insulin and metformin to limit insulin associated weight gain. There is a past medical history of an inferior myocardial infarction and previous severe narrow-angle glaucoma. Over the past few weeks he has complained of increasingly severe burning pain in both lower legs.

On examination his BP is 142/82 mmHg, pulse is 70 and regular. There is bilateral loss of sensation to below the knees.

Investigations show:

Haemoglobin	127 g/L	(135-177)
White cell count	6.9 ×10 ⁹ /L	(4-11)
Platelets	189 ×10 ⁹ /L	(150-400)
Sodium	138 mmol/L	(135-146)
Potassium	4.9 mmol/L	(3.5-5)
Creatinine	143 μmol/L	(79-118)
HbA _{1c}	63 mmol/mol	(<48)
	7.9%	(<6.5)

Which of the following is the most appropriate way to manage his neuropathic pain according to NICE guidance?

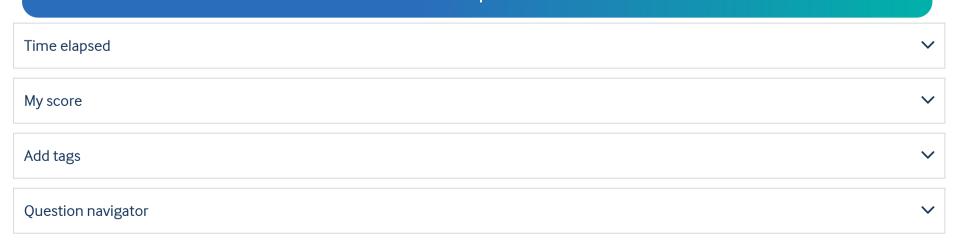
\circ	Pregabalin
\bigcirc	Topical lidocaine
\bigcirc	Duloxetine
\circ	Amitriptyline

Gabapentin

 \bigcirc

 \bigcirc

Answer question



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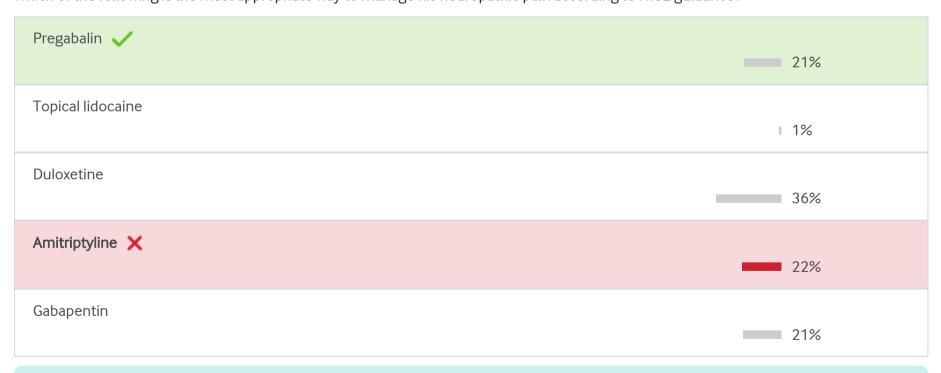
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Which of the following is the most appropriate way to manage his neuropathic pain according to NICE guidance?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• Amitryptilline can also cause glaucoma

Explanation

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Amitriptyline is recommended by NICE as an option for second line therapy in patients for whom home duloxetine is unsuitable. In this case it is contraindicated because of the history of previous glaucoma. Doses of 10-75 mg amitriptyline are usually appropriate, but again is contraindicated here due to history of glaucoma.

Duloxetine is first line therapy for neuropathy except where it is contraindicated due to a history of glaucoma or previous hypersensitivity.

Pregabalin or gabapentin can be considered as second or third line monotherapy or in combination. However where there is renal impairment, pregabalin is preferable over gabapentin.

Opiates such as tramadol are not usually as effective as anti-depressants or anti-epileptics in the management of neuropathic pain.

Reference:

NICE. Neuropathic pain - pharmacological management (CG173).

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Question 34 of 121

☆ High impact question

A 56-year-old female presents to her GP with tiredness of three years' duration. No specific abnormalities are found and eventually the GP undertakes some blood tests. He is surprised to find an elevated calcium concentration and refers the patient to you.

She has been well but has been depressed of late since the death of her elderly parents. In her past history she states that her elder brother and his son had some calcium problem diagnosed approximately six years ago although to her knowledge they have not received any treatment. She takes only atenolol for hypertension but receives no other therapy and does not take any supplements.

Examination reveals a blood pressure of 148/96 mmHg but no other abnormalities are noted.

Investigations reveal the following:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	3.8 mmol/L	(3.5-4.9)
Serum urea	7.1 mmol/L	(2.5-7.5)
Serum calcium	2.76 mmol/L	(2.2-2.6)
Serum phosphate	1.0 mmol/L	(0.8-1.4)
Alkaline phosphatase	100 U/L	(45-105)
PTH concentration	4.4 pmol/L	(0.9-5.4)
Urine calcium	1.2 mmol/24 hrs	(2-10)

What treatment would you advise?

- O Low calcium diet
- Parathyroidectomy
- Bisphosphonate therapy
- Loop diuretic therapy
- O No treatment is required

Answer question Time elapsed My score Add tags Question navigator

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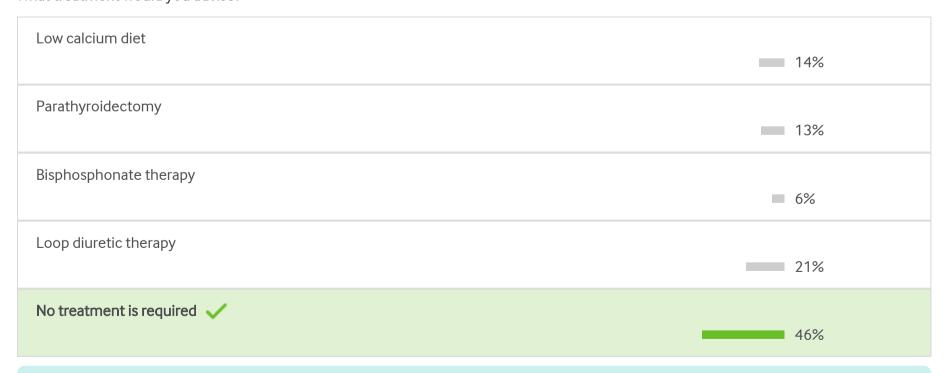
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What treatment would you advise?



Key learning points 🛭



Endocrinology

• FHH is autosomal dominant

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Explanation

This patient has mild hypercalcaemia with normal parathyroid hormone (PTH), alkaline phosphatase and reduced urine calcium.

Together with the family history of 'calcium problems' a diagnosis of familial hypocalciuric hypercalcaemia (FHH) is suggested.

This condition is autosomal dominant and is a consequence of down regulation of the calcium receptor resulting in compensatory hypercalcaemia. FHH is often misdiagnosed as primary hyperparathyroidism but may be distinguished from the latter by the positive family history together with the markedly low urine calcium excretion.

Unlike hyperparathyroidism it is not associated with any specific abnormality, is benign and requires no treatment.

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Question 35 of 121

A 39-year-old man comes to the clinic with resistant hypertension.

He is currently managed with ramipril and amlodipine and his BP is 155/98 mmHg. His BMI is 22. There is no medical history of note apart from mild asthma for which he takes a salbutamol inhaler.

Investigations show:

Haemoglobin	136 g/L	(135-177)
White cell count	7.2 ×10 ⁹ /L	(4-11)
Platelets	182 ×10 ⁹ /L	(150-400)
Sodium	142 mmol/L	(135-146)
Potassium	3.3 mmol/L	(3.5-5)
Creatinine	129 μmol/L	(79-118)

Ultrasound abdomen - right adrenal adenoma.

Surgery is being planned for his adrenal adenoma.

Which of the following agents should be selected to improve his blood pressure?

DoxazosinSpironolactoneBisoprololIndapamideNebivolol

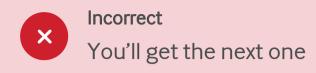
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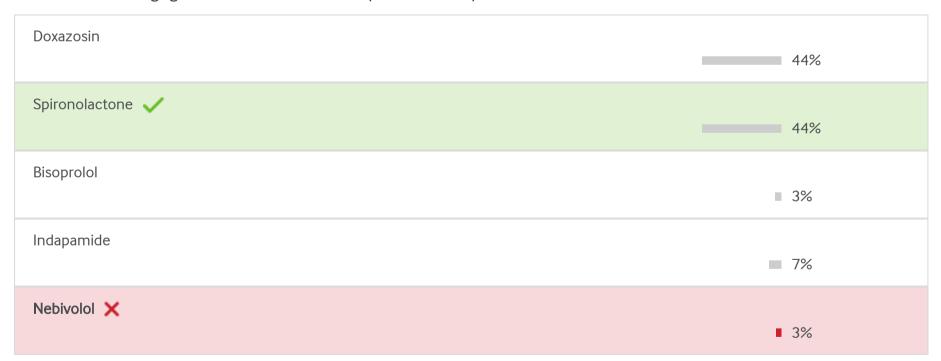
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Ultrasound abdomen - right adrenal adenoma.

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Which of the following agents should be selected to improve his blood pressure?



Key learning points 💡

Endocrinology

• In Conn's syndrome Aldosterone inhibition with spironolactone will bring the greatest additional reduction in blood pressure.

Explanation

The most likely diagnosis is Conn's syndrome, leading to hyporeninaemic hyperaldosteronism. The ultrasound scan and hypokalaemia on angiotensin-converting enzyme (ACE) inhibitor support the diagnosis of Conn's syndrome.

Aldosterone inhibition with spironolactone will bring the greatest additional reduction in blood pressure.

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None of the other options are direct aldosterone antagonists; as such they are not as effective in lowering blood pressure in Conn's syndrome as is spironolactone.

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Question 36 of 121

☆ High impact question

An 18-year-old male has been referred to the endocrine clinic with low libido and difficulty forming sexual relationships.

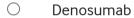
On examination he is tall (6 feet 3 inches). His BP is 122/82 mmHg, pulse is 70 and regular, his BMI is 21. He has a long arm span and sparse secondary sexual hair. His testes are small (less than 5 ml bilaterally).

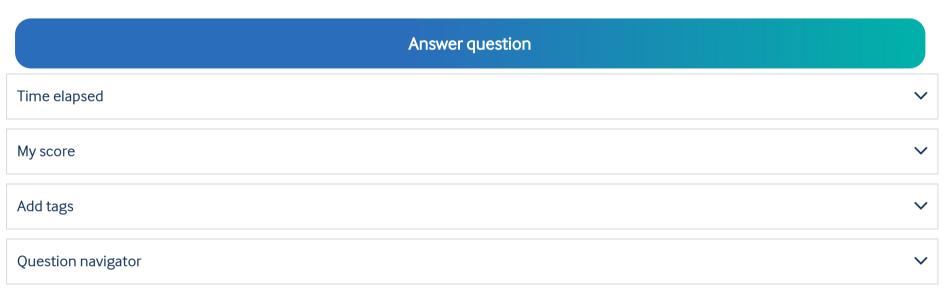
You are concerned about his long term risk of osteoporosis.

How would you propose to manage him?

\bigcirc	Alendronate
\bigcirc	Testosterone
\bigcirc	Teriparatide

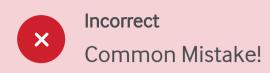






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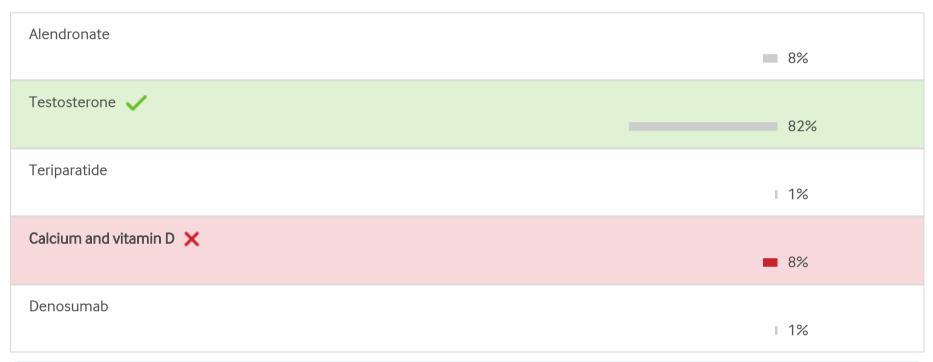
★ High impact question

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On examination he is tall (6 feet 3 inches). His BP is 122/82 mmHg, pulse is 70 and regular, his BMI is 21. He has a long arm span and sparse secondary sexual hair. His testes are small (less than 5 ml bilaterally).

You are concerned about his long term risk of osteoporosis.

How would you propose to manage him?



Endocrinology

• Patients with Kleinfelters syndrome should receive testosterone treatment to reduce their risk of osteoporotic fracture.

Explanation

This man has a clinical picture which is consistent with Klinefelter's syndrome. As such the primary defect which leads to <u>osteoporosis</u> is testosterone deficiency, and replacing this will significantly reduce his risk of osteoporosis.

Alendronate, calcium and vitamin D, denosumab and teriparatide are all treatments used in patients at high risk of osteoporosis.

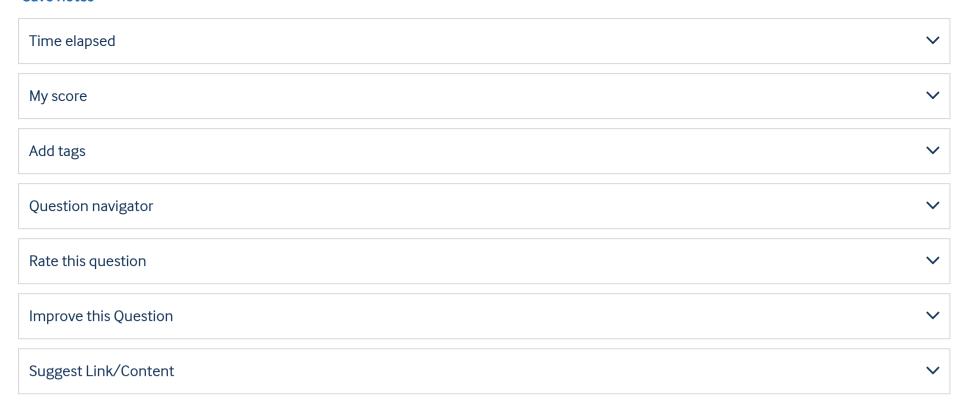
However in Klinefelter's syndrome the primary defect causing <u>osteoporosis</u> is hypogonadism therefore testosterone replacement is the best initial management option.

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Question 37 of 121

A 36-year-old female recently diagnosed with thyrotoxicosis presents with a sore throat.

One month ago she commenced carbimazole 40 mg daily plus propranolol 40 mg bd and began to feel better but over the last one week she has been aware of a sore throat with painful swallowing.

On examination, her pulse is 80 beats per minute regular and she has a modest non-tender goitre. No other abnormalities are noted. Her investigations reveal:

Haemoglobin	125 g/L	(115-165)
Platelets	220 ×10 ⁹ /L	(150-400)
White cell count	3.8 ×10 ⁹ /L	(4-11)
Neutrophils	1.4 ×10 ⁹ /L	(1.5-7)
Lymphocytes	2 ×10 ⁹ /L	(1.5-4)
Free T4	23.1 pmol/L	(10-22)
TSH	<0.05	(0.4-5)
TSH receptor antibody	Positive	

What is the most appropriate treatment for this patient?

- Add prednisolone therapy
- $\bigcirc \qquad \text{Stop carbimazole and treat with radioactive iodine} \\$
- O Continue carbimazole
- Thyroidectomy
- O Stop carbimazole and change to propylthiouracil

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Lymphocytes	2 ×10 ⁹ /L	(1.5-4)
Free T4	23.1 pmol/L	(10-22)
TSH	<0.05	(0.4-5)
TSH receptor antibody	Positive	

What is the most appropriate treatment for this patient?



Key learning points 🛭



Endocrinology, Therapeutics

• Carbimazole may cause neutropenia (defined as neutrophils <0.5 ×10 9/L)

Explanation

This patient has Graves' disease as suggested by positive thyroid-stimulating hormone (TSH) receptor antibodies, but has developed a sore throat on carbimazole.

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One of the side effects of carbimazole is neutropenia (defined as neutrophil count less than $0.5 \times 10^9 / L$) and therefore a full blood count (FBC) was urgently requested. In this patient the white blood count (WBC) and neutrophil count are just below normal but are not likely to be related to the sore throat and there is no indication to stop the carbimazole.

In fact a mild decrease in WBC can also occur with hyperthyroidism.

The most appropriate treatment would be to continue the carbimazole until the level drops to $<1.5 \times 10/L$, after which the drug should be held and blood counts monitored. This is because even after stopping the drug will continue to work for a period of time until it is eliminated from the system.

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Question 38 of 121

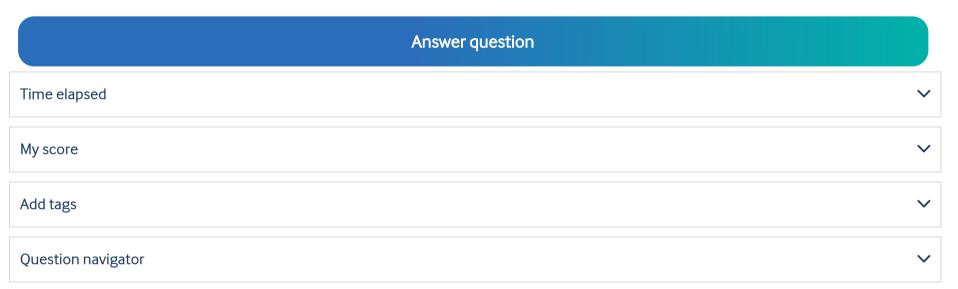
A 26-year-old woman with a past history of schizophrenia is admitted via the Emergency Department with nausea and lethargy.

On clinical examination, she is clinically euvolaemic with Glasgow Coma Score (GCS) of 14. There are no focal neurological signs. The serum sodium concentration is 114 mmol/L. There is no history of seizure activity.

What is the most appropriate next step in correcting her abnormal biochemistry?

	00111			
\circ	3% N	saline	infusion	

- O Furosemide 50 mg IV
- Fluid restriction
- O Demeclocycline PO
- O.9% N. saline infusion



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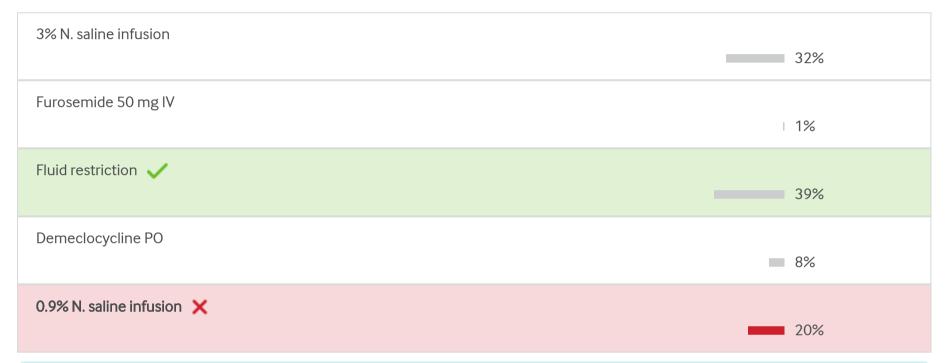
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What is the most appropriate next step in correcting her abnormal biochemistry?



Critical Care, Endocrinology

• Hyponatraemia should be corrected slowly, except where seizures or significant neurological dysfunction occurs.

Explanation

The most likely diagnosis is a syndrome of inappropriate antidiuretic hormone (SIADH) secretion. The most likely cause in this patient is her medication. Numerous psychiatric medications, particularly antipsychotics such as haloperidol, quetiapine, and clozapine can cause this condition.

Although her sodium is very low, she has not suffered any seizures and we must be wary of raising serum sodium by more than 10 mmol/24 hours due to the risk of central pontine myelinolysis. Fluid restriction is the first step with ADH antagonists such as tolvaptan and demeclocyline reserved for more refractory cases.

As the patient appears volume replete, administration of saline is not the correct initial move. The problem is due to an excess of free body water; therefore, restriction of this is the first step.

Reference:

Clinical review: Practical approach to hyponatraemia and hypernatraemia in critically ill patients

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Hydrocortisone

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Question 39 of 121

A 35-year-old Chinese man is admitted to hospital after collapsing at work.

He gives a six month history of weight loss (5 kg) and palpitations and has been started by his GP on venlafaxine for anxiety. On examination he has marked proximal muscle weakness of upper and lower limbs and is hyporeflexic.

Which of the following treatments is likely to provide immediate relief from these symptoms?

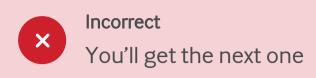
\circ	Potassium infusion
\circ	Calcium infusion
\circ	Alfacalcidol
\circ	Carbimazole

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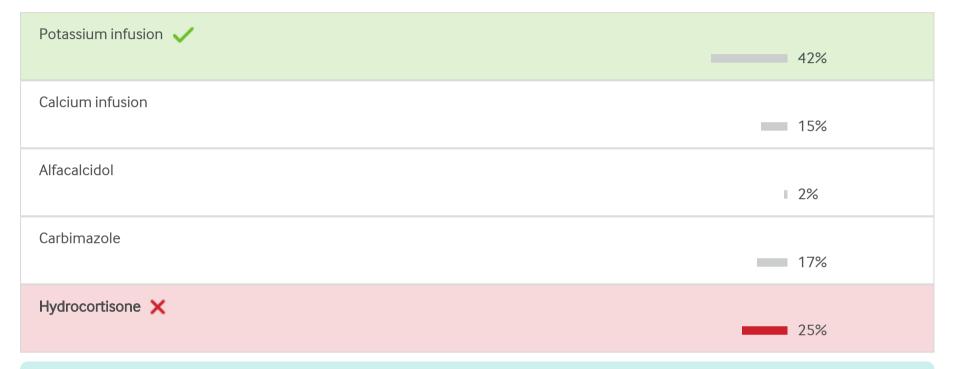
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Key learning points 🛭

Endocrinology, Metabolism, Thyroid

• Episodes of hypokalaemic periodic paralysis occur in 10% of young Latin American or Asian men with thyrotoxicosis

Explanation

The history describes an episode of collapse in a patient with thyrotoxicosis. The likely cause of the collapse is thyrotoxic hypokalaemic periodic paralysis.

Episodes of hypokalaemic periodic paralysis occur in 10% of young Latin American or Asian men with thyrotoxicosis (of whatever aetiology).

Acute attacks respond to potassium administration.

The periodic paralysis resolves when the thyrotoxicosis is treated.

Further Reading:

Periodic Paralysis International. <u>Hypokalemic Periodic Paralysis.</u>

Next question

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Question 40 of 121

A 71-year-old man presents to the clinic for review. He has recently suffered an inferior myocardial infarction which was treated by angioplasty and stenting and has mild residual heart failure.

He is managed with a BD mixed insulin and metformin, previously well controlled, he has lost weight over recent months and now has troublesome hypoglycaemia mid-afternoon.

On examination his BMI is 27, BP is 125/72 mmHg, pulse is 75 and regular. He is not in cardiac failure.

Investigations show:

Haemoglobin	137 g/L	(135-177)
White cell count	8.9 ×10 ⁹ /L	(4-11)
Platelets	169 ×10 ⁹ /L	(150-400)
Sodium	139 mmol/L	(135-146)
Potassium	4.8 mmol/L	(3.5-5)
Creatinine	129 µmol/L	(79-118)
HbA _{1c}	42 mmol/mol	(<42)
	6.0%	(<6.0)

Which of the following is the most appropriate way to manage him?

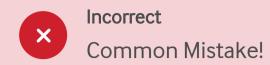
- O Reduce his insulin dose
- O Change his insulin to sitagliptin
- O Change his insulin to pioglitazone
- O Keep his insulin dose the same and transfer him to basal bolus
- O Stop his metformin

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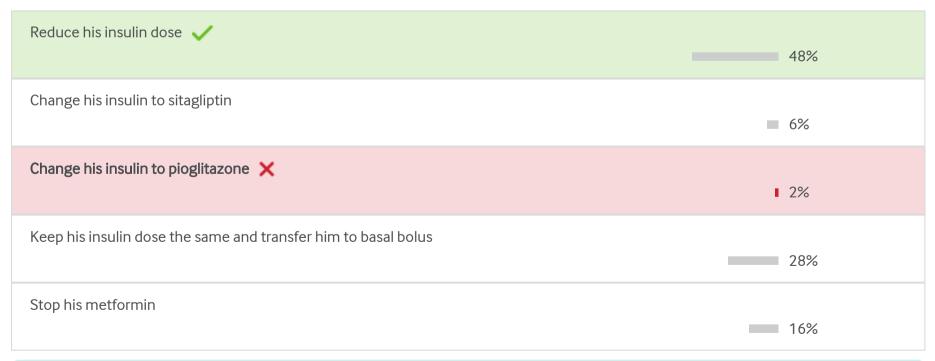
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Key learning points 🛭



Endocrinology

• Diabetic patients on insulin with a history of ischaemic heart disease should try to minimise hypoglycemic episodes as this can precipitate ischaemia.

Explanation

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Evidence from ACCORD and VADT suggests that in patients with a history of previous cardiovascular disease, there is significant risk of further ischaemic cardiovascular events in patients who suffer hypoglycaemic episodes. As such the optimal course of action is to reduce his insulin dose.

Glitazones should be avoided in patients who have a previous history of heart failure, and there are no outcome data for the use of DPP4- inhibitors in the management of type 2 diabetes with a previous history of cardiovascular disease.

Transferring him to basal bolus will not affect his HbA_{1c} which is already quite low, and reducing his metformin is not appropriate as he has not quite reached the cut off point for stopping it, and there are cardiovascular outcome data supporting the use of metformin in the type 2 diabetes population.

Next question

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BMJ On Exam

English French

Question 41 of 121

A 54-year-old man was referred to the medical outpatient clinic for assessment of fatigue.

He gave a six month history of generalised malaise and feeling 'tired all the time'. He had a past history of hypertension that had been monitored by his general practitioner but this had not required treatment. He had also reported feeling in a 'low mood' to his GP, but attributed this to the fatigue.

Investigations show:

НЬ	149 g/L	(130-180)
WBC	8.1 ×10 ⁹ /L	(4-11)
Platelets	179 ×10 ⁹ /L	(150-40)
MCV	102 fL	(80-96)
Sodium	133 mmol/L	(137-144)
Potassium	3.9 mmol/L	(3.5-4.9)
Urea	2.0 mmol/L	(2.5-7.5)
Creatinine	110 μmol/L	(60-110)
Bilirubin	28 μmol/L	(1-22)
Total protein	69 g/L	(61-76)
Albumin	35 g/L	(37-49)
Alk Phos	210 U/L	(45-105)
AST	98 IU/L	(1-31)
Gamma GT	299 U/L	(<65)
9am Plasma cortisol	877 nmol/L	(200-500)
12am Plasma cortisol	720 nmol/L	(55-250)
24-hour urinary free cortisol	1120 nmol/L	(215-860)

What is the most likely underlying cause of these abnormalities?

- LiquoriceAlcoholPituitary adenomaAdrenal hyperplasia
- O Ectopic ACTH secretion

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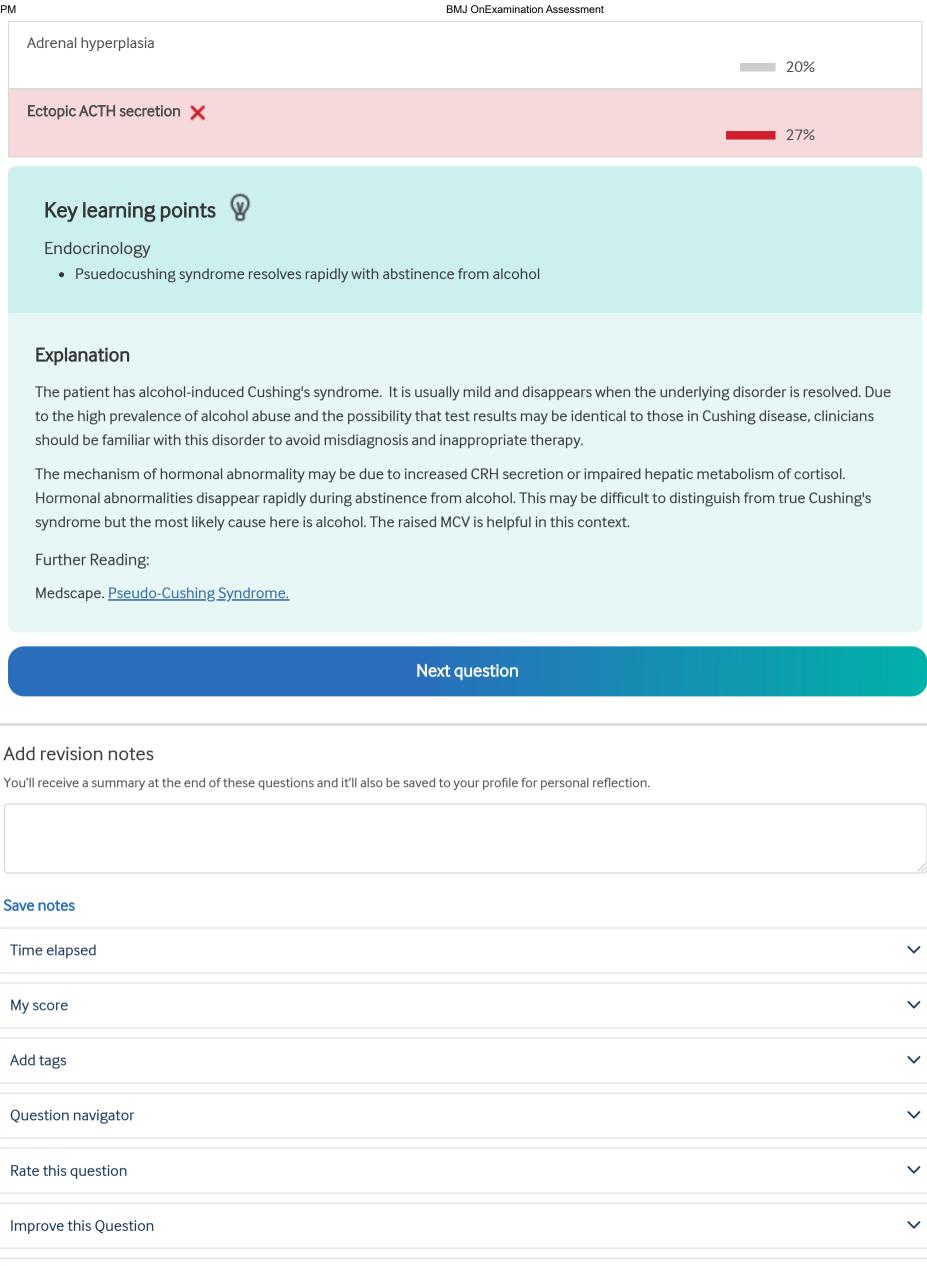
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Question 42 of 121

A 45-year old lady presents with a new diagnosis of type 2 diabetes, Further questioning produces suspicion of cortisol excess. This is supported by findings of striae, centripetal obesity and proximal myopathy.

Initial investigations revealed the following results:

Haemoglobin	145 g/L	(115-165)
White cell count	12.5 ×10 ⁹ /L	(4-11)
Platelets	360 ×10 ⁹ /L	(150-400)
Sodium	145 mmol/L	(137-144)
Potassium	3.2 mmol/L	(3.5-4.9)
Urea	7.5 mmol/L	(2.5-7.5)
Creatinine	102 μmol/L	(60-110)
Albumin	36 mg/L	(37-49)
Bilirubin	20 μmol/L	(1-22)
AST	96 U/L	(5-40)
ALT	105 U/L	(5-40)
Alkaline phosphatase	130 U/L	(45-105)
Urine free cortisol	880 nmol/d	(<250)
ACTH	35 ng/ml	(20-60)

Further investigations reveal a normal chest x ray and an ultrasound scan of the abdomen reveals a bulky adrenal glands. The patient then undergoes a low dose dexamethasone suppression test (0.5 mg qds for 48 hours):

Baseline Cortisol 850 nmol

Normal Cortisol 280-700 nmol/L

End test Cortisol 100 nmol/L

The patient then goes on to have a high dose dexamethasone suppression test performed (1 mg qds for 48 hours)

Baseline cortisol 900 nmol/L

End test cortisol 45 nmol/L

A MRI of the pituitary gland is performed and no abnormality reported.

Which is the next most appropriate action for this patient?

- Hypophysectomy
- O Inferior petrosal sinus sampling
- Laproscopic left sided adrenalectomy
- O Bilatral adrenal vein sampling

 \bigcirc

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High resolution CT scan of the thorax

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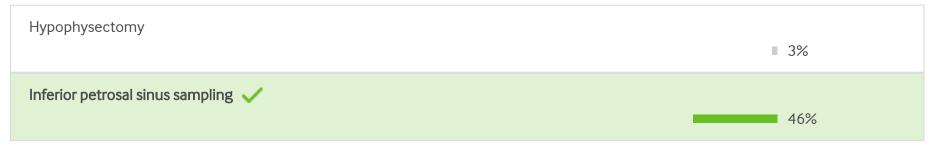
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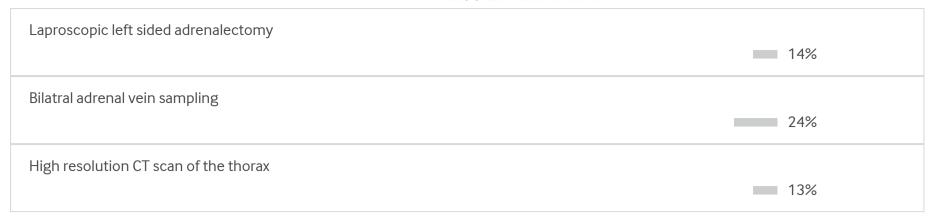
Baseline cortisol 900 nmol/L

End test cortisol 45 nmol/L

 ${\sf A\,MRI}$ of the pituitary gland is performed and no abnormality reported.

Which is the next most appropriate action for this patient?





Key learning points 🛛



Diabetes, Endocrinology

• 40% of microadenomas will not be seen on imaging, therefore petrosal sinus sampling is necessary to confirm pituitary source of cortisol (ACTH) excess.

Explanation

This patient has evidence of adrenocorticotropic hormone (ACTH)-dependent Cushing's syndrome which is most likely to be Cushing's disease.

The patient has historical and physical features of Cushing's syndrome including malaise, psychological disturbance, diabetes hypertension as well as skin changes. The low dose dexamethasone test failing to suppress to less than 50 confirms the diagnosis.

The question remains as to the source of the ACTH and suppression with high dose dexamethasone suggests a pituitary source however this is an unreliable test on which to base surgery given the normal MRI scan which would be expected to identify 50-60% of microadenomas.

Thus one must still differentiate between Cushing's disease and ectopic Cushing's due for instance to a carcinoid tumour.

Thus, the most appropriate investigation is inferior petrosal sinus (IPS) sampling with cortisol releasing hormone (CRH) stimulation to compare IPS and plasma ratios of ACTH to confirm the pituitary origin.

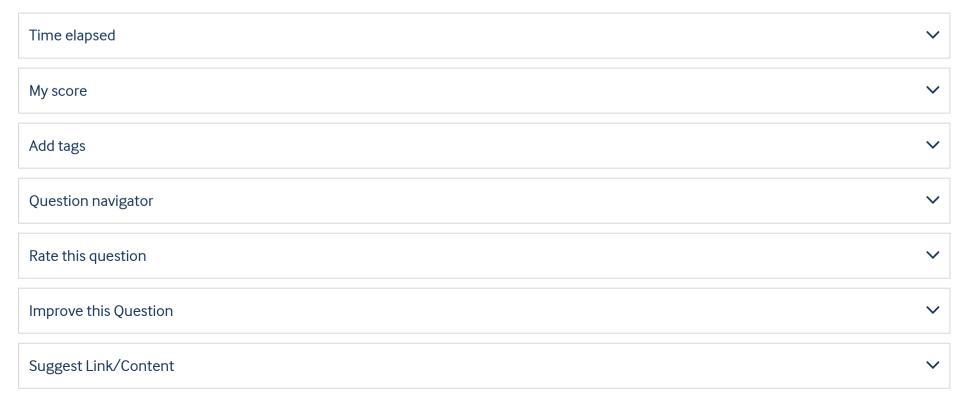
The adrenal changes on ultrasound scanning are likely secondary to chronic ACTH stimulation.

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Question 43 of 121

★ High impact question

This 52-year-old male is referred with reduced shaving frequency and reduced libido of at least five years duration.



Examination reveals the appearances as shown and he is noted to have a bitemporal hemianopia and slight galactorrhoea to expression.

What is the most likely diagnosis?

- O Non-functional pituitary tumour
- Macroprolactinoma
- Acromegaly
- Microprolactinoma
- O Klinefelter's syndrome

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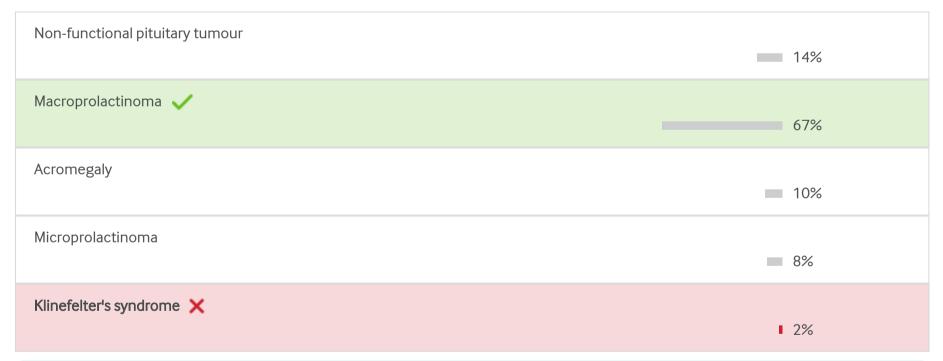
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Examination reveals the appearances as shown and he is noted to have a bitemporal hemianopia and slight galactorrhoea to expression.

What is the most likely diagnosis?



Key learning points 🛭



Endocrinology, Photographic

• Macroadenoma witll cause visual field defects

Explanation

This patient has typical features of <u>hypopituitarism</u> and the galactorrhoea suggests hyperprolactinaemia.

In the presence of optic chiasmal compression the diagnosis is likely to be a macroprolactinoma.

Although stalk compression with a non-functioning tumour may cause hyperprolactinaemia the concentrations of prolactin are usually below 2000 mU/L and galactorrhoea would be rare.

The patient does not appear acromegalic.

Next question

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Question 44 of 121

☆ High impact question

A 31-year-old woman who works in a pharmacy comes to the clinic for review.

Over the past few months she has lost increasing amounts of weight and has become increasingly anxious about palpitations, which particularly occur at night. Her GP has measured a TSH which is <0.1 IU/I (0.5-4.5).

On examination her BP is 122/72 mmHg, her pulse is 92 and regular. You cannot palpate goitre or any nodules on examination of her neck.

Which of the following investigations is likely most to differentiate between self administration of thyroid hormone and endogenous causes of thyrotoxicosis?

or city!		
\circ	Free T4	
\circ	Ultrasound thyroid	
\bigcirc	Free T3	
\circ	Radioactive uptake thyroid scan	
\circ	Thyroid binding globulin	
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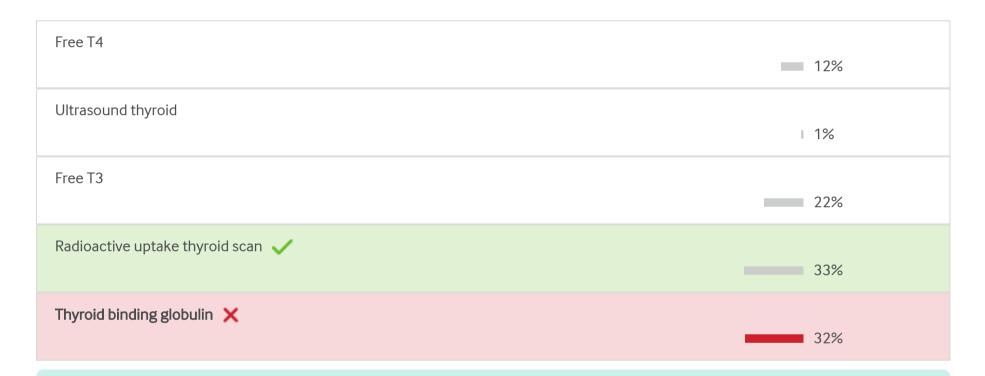
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On examination her BP is 122/72 mmHg, her pulse is 92 and regular. You cannot palpate goitre or any nodules on examination of her neck.

Which of the following investigations is likely most to differentiate between self administration of thyroid hormone and endogenous causes of thyrotoxicosis?



Endocrinology

• In thyrotoxicosis factitia, uptake is globally reduced on a radioactive uptake scan.

Explanation

Graves' disease is associated with diffusely increased radioactive uptake in the thyroid. A solitary hot nodule demonstrates increased uptake in one area, with decreased uptake elsewhere, toxic multinodular goitre, multiple areas of increased uptake.

In thyrotoxicosis factitia, uptake is globally reduced.

Free T3, free T4 and thyroid binding globulin are unhelpful in determining whether thyrotoxicosis is due to exogenous administration of thyroid hormone or not.

Ultrasound may be useful for demonstrating thyroid nodules, but these are not the only cause of thyrotoxicosis.

Next question

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Question 45 of 121

A 49-year-old woman who has a 20 year history of bipolar disease comes to the endocrine clinic for review. Current therapy includes lithium and olanzapine, and over the past two to three months she has suffered from steadily worsening polyuria and polydipsia. She has also suffered from weight gain of 6 kg since starting olanzapine. On examination her BP is 132/88, pulse is 78 and regular, there is a 10 mmHg postural drop in BP on standing. There are no heart murmurs, chest is clear. She is obese with a BMI of 32.

Investigations:

НЬ	115 g/l	(115-160)
WCC	5.1x10(9)/I	(3.8-10.8)
PLT	191x10(9)/I	(150-450)
Na	145 mmol/l	(135-145)
K	4.9 mmol/l	(3.5-5.5)
Bicarbonate	25 mmol/l	(18-28)
Cr	115 micromol/l	(50-90)
Glucose	7.1 mmol/l	(<7)

Post water deprivation results:

Serum osmolality: 320

Urine osmolality: 285 (no significant change after DDAVP)

Which of the following is the most likely cause of the clinical picture seen here?

- Activation of SGLT-2
- O Hyper-functioning of aquaporin 2
- \bigcirc Reduced production of ADH
- Reduced GSK3beta signalling
- Reduced functioning of SGLT-1

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Investigations:

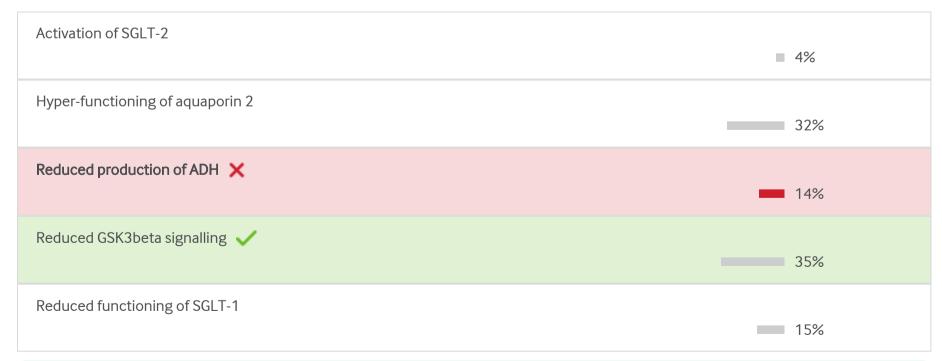
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WCC	5.1x10(9)/I	(3.8-10.8)
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Glucose	7.1 mmol/l	(<7)

Post water deprivation results:

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Urine osmolality: 285 (no significant change after DDAVP)

Which of the following is the most likely cause of the clinical picture seen here?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• The mechanism by which lithium leads to diabetes insipidus, reduced GSK3 beta signalling, is well established.

Explanation

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Lithium inhibits signalling pathways that involve glycogen synthase kinase type 3 beta (GSK3beta), resulting in dysfunction of the aquaporin-2 water channel. This then results in the development of nephrogenic diabetes insipidus. The failure of urine to concentrate following water deprivation and DDAVP administration is consistent with the diagnosis. Withdrawal of lithium can lead to an improvement in symptoms.

Hyperglycaemia leads to sodium and water excretion via the SGLT-2 transporter in the kidney, and drives dehydration in patients with significant hyperglycaemia. SGLT-1 is a transporter found predominantly in the gut, and is responsible for glucose absorption. Reduced production of ADH is not a cause of nephrogenic diabetes insipidus, and reduced GSK3 beta signalling actually leads to hypo-functioning of aquaporin 2.

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English French

Question 46 of 121

A 64-year old insulin controlled type 2 diabetic is seen with a 'flu-like illness. She has been feeling unwell for the last 24 hours. She has not been vomiting and is managing to take regular fluids and snacks, but her intake is reduced compared to usual.

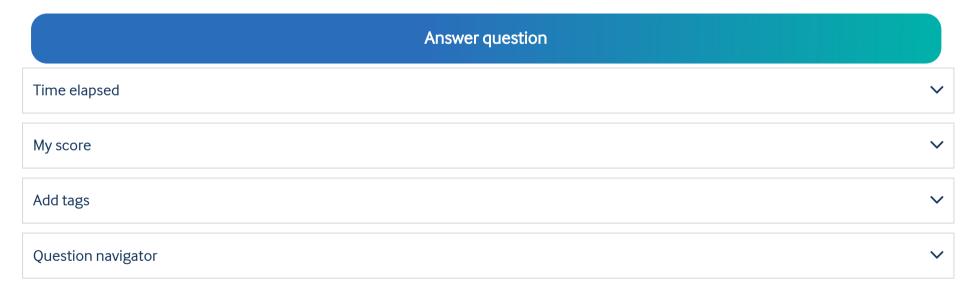
She takes a mixed insulin twice a day and her daily insulin dose is 30 units. She usually has good glycaemic control, her last HbA $_{1c}$ 3 months ago was 52 mmol/mol. Her blood sugars over the last 24 hours have been between 5.0 and 9.0 mmol/L.

You advise her to monitor her blood glucose every 4 hours. If she starts vomiting, is unable to keep fluids down, or is unable to control her blood sugar, she is told to seek urgent medical advice.

She telephones the surgery later that day as her blood glucose has increased to 15 mmol/L. She is usually consistently in single figures. She is still managing to drink fluids adequately and is managing to eat carbohydrates as meal replacement. There is no vomiting or diarrhoea and she does not feel more unwell.

In terms of managing her blood glucose levels, which of the following is the most appropriate advice to give?

- Add an extra four units of insulin to each dose she takes and continue to test blood glucose levels every four hours. If her blood glucose is above 13 mmol/L she should recontact for advice.
- Add an extra two units of insulin to each dose she takes and continue to test blood glucose levels every four hours. If her blood glucose is above 13 mmol/L she should recontact for advice
- Add an extra six units of insulin to each dose she takes and continue to test blood glucose levels every six hours. If her blood glucose is above 13 mmol/L she should recontact for advice.
- No change in insulin dose needed if she feels no worse. Continue to monitor blood glucose every four hours and seek advice if glucose is 20 mmol/L or more
- Reduce oral carbohydrate intake, keep insulin dose the same, and continue to check glucose levels four hourly. Recontact for advice if blood glucose is 20 mmol/L or more



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27%

Add an extra two units of insulin to each dose she takes and continue to test blood glucose levels every four hours. If her blood glucose is above 13 mmol/L she should recontact for advice 🗸

37%

Add an extra six units of insulin to each dose she takes and continue to test blood glucose levels every six hours. If her blood glucose is above 13 mmol/L she should recontact for advice.

8%

No change in insulin dose needed if she feels no worse. Continue to monitor blood glucose every four hours and seek advice if glucose is 20 mmol/L or more

14%

Reduce oral carbohydrate intake, keep insulin dose the same, and continue to check glucose levels four hourly. Recontact for advice if blood glucose is 20 mmol/L or more X

13%

Key learning points 🛛



Diabetes, Endocrinology

• During periods of illness, type 2 diabetics should test their blood sugar levels at least 4 hourly.

Explanation

A key part of counselling a diabetic started on insulin is what to do if they are unwell. For type 2 diabetics, if they are unwell they should test their blood glucose at least every 4 hours.

For this question, we have used the TREND UK (Training, research and education for nurses in diabetes UK) and Leicestershire NHS insulin guidelines.

The TREND UK guidance advises that if blood glucose is less than 13 mmol/L, insulin should be taken as normal; if blood glucose is more than 13 mmol/L then insulin adjustment is needed.

The Leicestershire NHS guidance is identical aside from it using a cut-off of 11 mmol/L rather than 13 mmol/L.

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Use the links to both below to have a look at the algorithms as these will enable you to follow the management of the patient in this scenario.

This patient needs an additional two units of insulin added to each dose and to continue to monitor her glucose levels every four bours

References:

NICE Clinical Knowledge Summaries: Insulin therapy in type 2 diabetes

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BMJ On Exam

English French

Question 47 of 121

A 33-year-old nurse is admitted for prolonged fasting.

She originally presented to clinic with a history of episodic sweating and light-headedness which had developed over a six month period, with symptoms being entirely relieved by eating.

She had developed one of these episodes whilst on the ward and a BM monitor showed a value of 2 mmol/L. She took some glucose tablets and had quickly recovered.

On examination no specific abnormalities were found, with a blood pressure of 118/74 mmHg, a pulse of 72 beats per minute and a BMI of 22 kg/m².

She was admitted for a 72 hour fast and at 3 am, 16 hours into the fast, she developed typical symptoms. Her BM is measured at 2.2 mmol/L, the fast is stopped and bloods taken.

Her results show:

Plasma glucose

1.8 mmol/L

(4.4 - 6.6mmol/L)

Plasma 3 beta-hydroxybutyrate

0.5 mmol/L

(>1)

Plasma insulin

450 pmol/L

(<21)

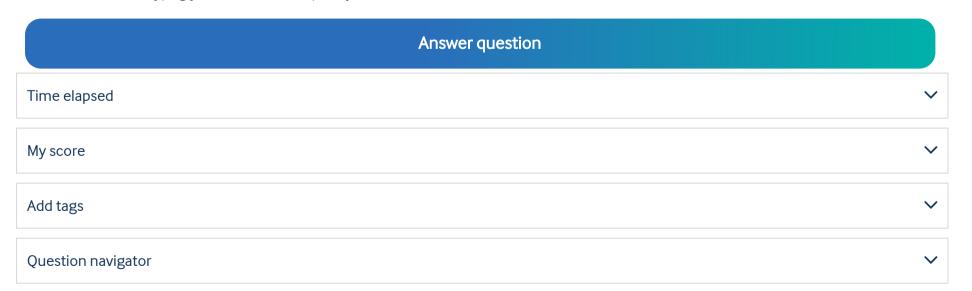
C peptide

0.2 nmol/L

(0.2-1)

What is the most likely diagnosis?

- Insulinoma
- O Factitious hypoglycaemia due to insulin treatment
- O Non-islet cell tumour hypoglycaemia
- Adult glycogen storage disease
- O Factitious hypoglycaemia due to sulphonylurea treatment



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Her results show:

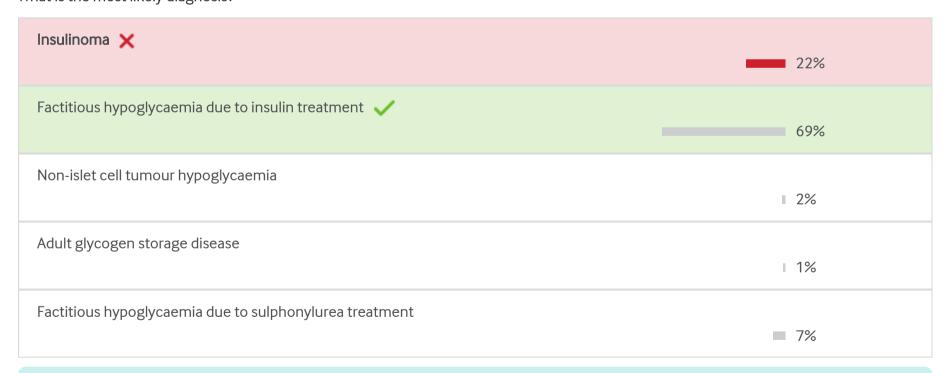
Plasma glucose 1.8 mmol/L (4.4 - 6.6 mmol/L)

Plasma 3 beta-hydroxybutyrate 0.5 mmol/L (>1)

Plasma insulin 450 pmol/L (<21)

C peptide 0.2 nmol/L (0.2-1)

What is the most likely diagnosis?



Diabetes, Endocrinology, Pharmacology, Therapeutics

• Raised insulin with low c-peptide indicates exogenous insulin

Explanation

This patient has developed hypoglycaemia with suppression of her 3 beta-hydroxybutyrate (a ketone), elevated insulin, yet suppressed C peptide. This would suggest that this is insulin induced hypoglycaemia, and as C peptide is suppressed indicates exogenous administration of insulin.

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Sulphonylureas would produce raised insulin and C peptides and could be assessed in suspicious cases by measuring a sulphonylurea concentration.

Insulinoma would be associated with proportionately elevated insulin and C peptide.

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English French

Question 48 of 121

☆ High impact question

A 17-year-old girl from a traveller family comes to the clinic for review. She is concerned that she may not be entering puberty properly as she has no secondary sexual hair development and has not begun her periods.

There is a past history of bilateral inguinal hernias which were repaired as an infant.

On examination she is 167 cm in height, her BP is 122/72 mmHg and BMI is 21. She has normal-looking breast development, although there is no pubic or axillary hair.

Investigations show:

Hb 124 g/L (115-160) WCC 8.0×10^9 /L (4-11) PLT 180×10^9 /L (150-400) Na 137 mmol/L (135-146) K 4.4 mmol/L (3.5-5.0) Cr 110 μmol/L (79-118)

Which of the following is the most likely diagnosis?

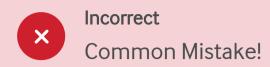
- O Klinefelter's syndrome
- Turner's syndrome
- Kallman's syndrome
- Normal puberty
- Androgen insensitivity syndrome

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9/10/24, 1:47 PM **BMJ OnExamination Assessment**

BMJ On Exam

English French



★ High impact question

A 17-year-old girl from a traveller family comes to the clinic for review. She is concerned that she may not be entering puberty properly as she has no secondary sexual hair development and has not begun her periods.

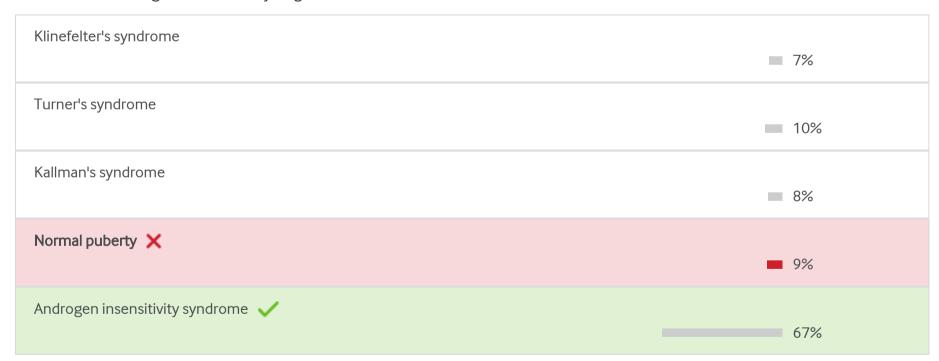
There is a past history of bilateral inguinal hernias which were repaired as an infant.

On examination she is 167 cm in height, her BP is 122/72 mmHg and BMI is 21. She has normal-looking breast development, although there is no pubic or axillary hair.

Investigations show:

Hb	124 g/L	(115-160)
WCC	8.0 ×10 ⁹ /L	(4-11)
PLT	180 ×10 ⁹ /L	(150-400)
Na	137 mmol/L	(135-146)
K	4.4 mmol/L	(3.5-5.0)
Cr	110 μmol/L	(79-118)

Which of the following is the most likely diagnosis?





Endocrinology

• The presence of breast development in the absence of secondary sexual hair, with a history of hernias as a child is suggestive of a diagnosis of androgen insensitivity syndrome.

Explanation

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The presence of breast development in the absence of secondary sexual hair, with a history of hernias as a child is suggestive of a diagnosis of androgen insensitivity syndrome. It is likely that the hernias were related to undescended testes. The vagina is blind ended, and there are no ovaries.

Kallman's syndrome is associated with absent gonadotropins due to malformation of the olfactory bulb, it leads to failure of sex hormone production and entry to puberty. Anosmia is a prominent clinical feature.

Klinefelter's is associated with a male phenotype.

Turner's is associated with short stature.

Normal puberty is unlikely given the absence of secondary sexual hair.

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BMJ On Exam

English French

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Question 49 of 121

A 45-year-old man with a 24 year history of type 1 diabetes comes to the clinic for review. His most recent HbA_{1c} was 66 mmol/mol. His main complaint on this occasion is regurgitation of food, indigestion, and problems gauging the correct dose of meal time insulin.

On examination his BP is 135/90 mmHg with a postural drop of 20 mmHg. There is bilateral sensory loss to the mid shin on both legs.

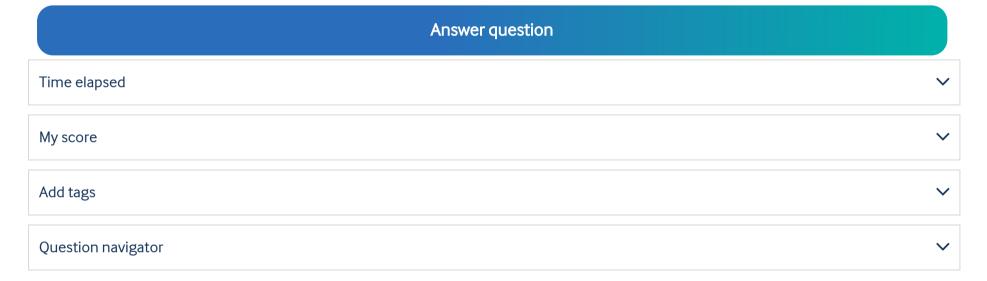
Which of the following is the best initial treatment for him?

\bigcirc	Ondansetron

_		
\circ	D I. I	- !
()	Prochlorper	azıne
\sim	I I OCI II OI DCI	uZII IC

\bigcirc	Cyclizine
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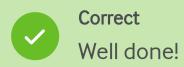
- Omeprazole
- Metoclopramide



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English French



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Key learning points 🛭

Endocrinology

• Metoclopramide is a pro-kinetic antiemetic and so is appropriate initial therapy for diabetic gastroparesis.

Explanation

Metoclopramide is a pro-kinetic antiemetic and so is appropriate initial therapy for diabetic gastroparesis.

Low dose erythromycin may be used as an alternative.

Cyclizine is a histamine H1 receptor blocker with additional anticholinergic and antiemetic properties. Cyclizine may be tried as an alternative to metaclopromide, and on occasions may be used in combination, although this is not recommended.

Omeprazole is a proton pump inhibitor and is therefore not the initial choice for gastroparesis.

 $On dansetron\ and\ prochlorperazine\ have\ a\ predominantly\ central\ antiemetic\ action.$

Next question

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English French

Question 50 of 121

This lady has a normal T4 and TSH.



What is the probable diagnosis?

- O Thyrotoxicosis factitia
- O Graves' disease
- O Sick euthyroid syndrome
- O Bilateral orbital tumours
- O Hashimoto's thyroiditis

Answer question	
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English French



This lady has a normal T4 and TSH.



What is the probable diagnosis?



Key learning points 🛭

Endocrinology, Ophthalmology, Photographic

• Grave's eye disease can occur in euthyroid, hypothyroid or hyperthyroid setting

Explanation

Graves' eye disease can occur in euthyroid, hypothyroid or hyperthyroid setting.

In rare instances, it is associated with an elevated T3 alone (T3 thyrotoxicosis).

The slide shows characteristic features of severe Graves' eye disease - termed 'malignant exophthalmos' in this case - proptosis, chemosis, palpebral oedema and periorbital swelling. It may require <u>orbital decompression</u>.

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BMJ On Exam

English French

Question 51 of 121

★ High impact question

Which of the following patients has results suggesting a diagnosis of SIADH?

Test	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Reference Range
Serum Na	150	136	128	128	128	135-145 mmol/L
Urine Na	18	35	12	50	40	
Serum osmolality	305	275	260	258	266	280-290 mOsm/kg
Urine osmolality	100	160	80	150	100	
TSH	2.0	12.5	4.2	2.0	3.5	1.0-4.5 mIU/L
9 AM cortisol	300	450	290	485	120	270-650 nmol/L

- O Patient 2
- O Patient 5
- O Patient 1
- O Patient 4
- O Patient 3

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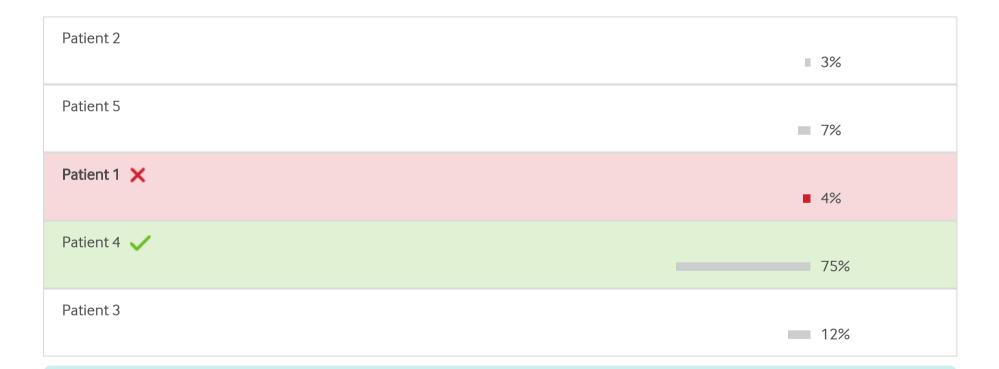
English French



☆ High impact question

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Urine osmolality	100	160	80	150	100	
TSH	2.0	12.5	4.2	2.0	3.5	1.0-4.5 mIU/L
9 AM cortisol	300	450	290	485	120	270-650 nmol/L



Endocrinology

• SIADH, ADH, normal regulation of osmolality.

Explanation

Patient 1 has results suggestive of diabetes insipidus.

Patient 2 has results suggestive of primary hypothyroidism.

Patient 3 has <u>hyponatraemia</u> but there is appropriate retention of Na and osmoles.

Patient 4 has results suggestive of syndrome of inappropriate secretion of antidiuretic hormone (SIADH) with inappropriate loss of Na and osmoles in the urine.

Patient 5 has results suggestive of Addison's disease.

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In health, plasma osmolality is tightly regulated by the secretion of ADH from the posterior pituitary gland in hyperosmolar or hypovolaemic states. ADH is usually released at a plasma osmolality above 280 mosmol/kg: this is called the osmotic threshold.

ADH promotes the conservation of water via two distinct mechanisms in the kidney. Firstly, it acts through the adenylate cyclase pathway to promote transcription and translation of aquaporin molecules. Secondly, it provokes a faster response via V2 receptors by increasing shuttling of pre-formed aquaporin molecules towards the membrane.

Aquaporin is a membrane-bound protein channel which promotes aquaresis, the passage of water but not solutes, out of the urine in the collecting duct and into the renal interstitium.

ADH also acts on a systemic level to increase vascular tone and blood pressure via V1 receptors.

<u>Hyponatraemia</u> is common and has been associated with adverse outcomes and mortality over the short and long term. One of the most common causes is SIADH, which is due to an altered pattern of ADH secretion. The most frequent patterns seen involve either excessive random secretion (type A), or a more controlled secretion stimulated by a lowered osmotic threshold (type B).

Rarer patterns include failure to suppress ADH in hypo-osmolar states (type C) and gain of function mutations affecting the vasopressin receptors (type D).

The diagnosis of SIADH requires the patient to be euvolaemic with a low serum sodium or osmolality (<134 mmol/l or <280 mosmol/kg respectively) with an inappropriately high urine sodium and osmolality (>40 mmol/l; >100 mosmol/kg), with exclusion of other causes such as glucocorticoid deficiency, hypothyroidism and diuretic therapy.

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BMJ On Exam

English French

Question 52 of 121

☆ High impact question

A 26-year-old woman presents to the Emergency department.

She has been feeling increasingly lethargic over the past few months and now has persistent vomiting. She has lost 5 kg over three months.

On examination her BP is 100/60 mmHg, pulse is 70 and regular. She is tanned. Her BMI is 21.

Investigations show:

Haemoglobin 122 g/L (115-160)White cell count $8.2 \times 10^9/L$ (4-11)222 ×10⁹/L **Platelets** (150-400)Sodium 130 mmol/L (135-146) 4.0 mmol/L (3.5-5)Potassium Creatinine 132 μmol/L (79-118)

Which of the following treatments is most likely to be effective?

- O IV normal saline
- O IV hydrocortisone
- Vasopressin
- Demeclocycline
- O Fluid restriction

Answer question Time elapsed My score Add tags Question navigator

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BMJ On Exam

English French



☆ High impact question

A 26-year-old woman presents to the Emergency department.

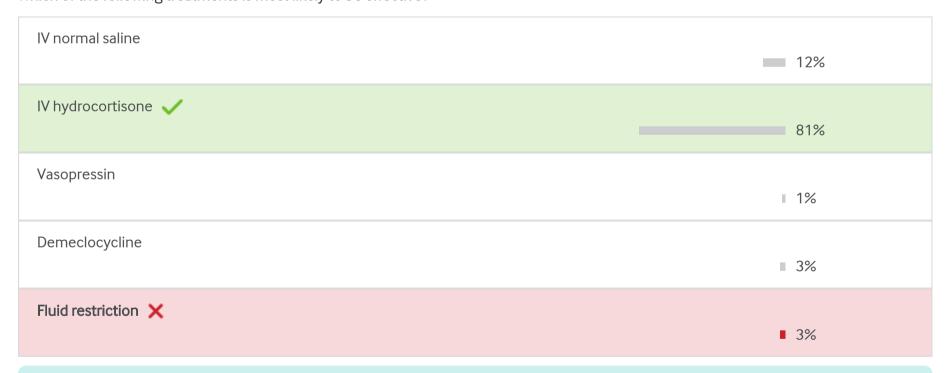
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Which of the following treatments is most likely to be effective?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• Steroid replacement is the initial management of adrenal insufficiency.

Explanation

<u>Hyponatraemia</u>, weight loss and skin pigmentation fits best with a diagnosis of adrenal insufficiency. Steroid replacement is the initial management.

The most likely cause is autoimmune adrenal failure. Serum potassium is not elevated in this case because of gastrointestinal loss related to vomiting.

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Fluid restriction and demeclocycline are not appropriate as it is unlikely that the <u>hyponatraemia</u> is related to syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Vasopressin is a treatment for cranial diabetes insipidus.

Whilst she may be dehydrated and require an IV, normal saline is not the primary treatment.

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English French

Question 53 of 121

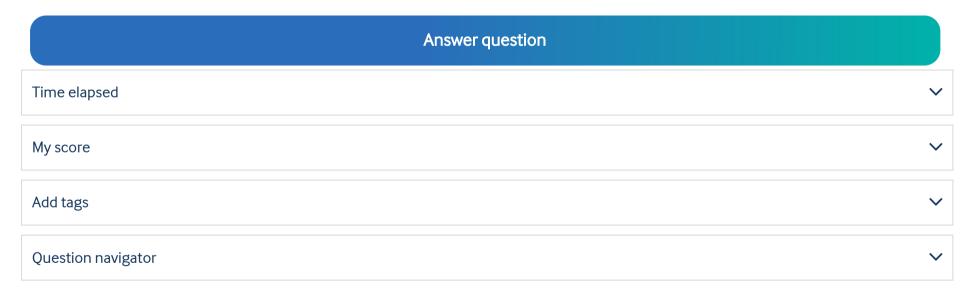
These are the shins of a 73-year-old female who is admitted as a consequence of increasing confusion and inability to look after herself.



The fire service had been called to her house as a small fire had started where she had left an electric heater on. Her family feel that she has gradually declined in cognition over the past six months.

Which one of the following investigations would be most likely to confirm the underlying diagnosis?

- O Plasma glucose concentration
- O CT head scan
- O Vitamin B₁₂
- Urea and electrolytes
- O Thyroid function tests



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English French

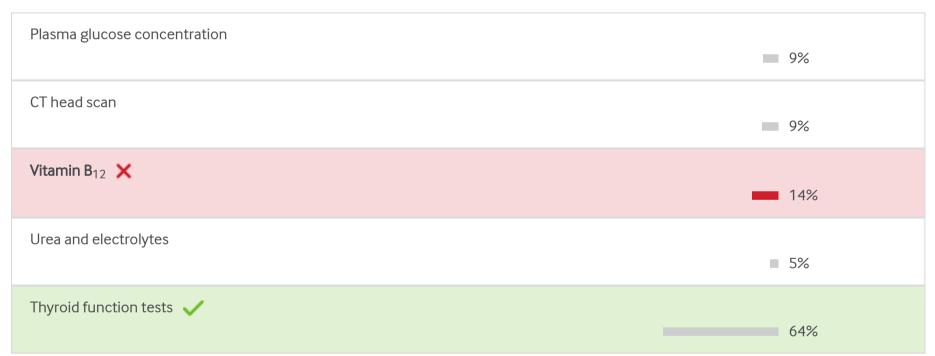


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Which one of the following investigations would be most likely to confirm the underlying diagnosis?



Key learning points 🛭



Emergency Medicine, Endocrinology, Photographic

• Erythem ab igne is due to fire/hot-water bottle use and may be secondary to symptomatic hypothyroidism

Explanation

The diagnosis is erythema ab igne and this is due to sitting too close to a fire. It frequently occurs on the front of the shins or lower back, the latter especially associated with the use of a hot water bottle.

In this patient's case the confusion and coldness with erythema ab igne suggest a diagnosis of hypothyroidism.

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BMJ On Exam

English French

Question 54 of 121

☆ High impact question

A 50-year-old female presents with palpitations and slight weight loss.

She has an uneventful medical history but takes supplements that she buys in a health food shop. She is a non-smoker and drinks little alcohol. There is a maternal aunt who has an underactive thyroid but nothing else of note in her history.

On examination she has a pulse of 96 beats per minute and a blood pressure of 122/76 mmHg. She has fine tremor of the outstretched hands and there is slight lid lag but no exophthalmos. No goitre is palpable.

Thyroid function tests reveal:

Free T4 29.3 pmol/L (10 - 22)

Free T3 5.3 pmol/L (3.5 - 5.5)

TSH <0.02 mU/L (0.4 - 5.0)

Thyroglobulin Undetectable

What is the most likely diagnosis?

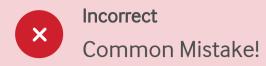
- O Factitious thyrotoxicosis
- O Toxic nodule
- Hashitoxicosis
- Dysthyroglobinaemia
- O Graves' disease

Answer question Time elapsed My score Add tags Question navigator

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BMJ On Exam

English French



☆ High impact question

A 50-year-old female presents with palpitations and slight weight loss.

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On examination she has a pulse of 96 beats per minute and a blood pressure of 122/76 mmHg. She has fine tremor of the outstretched hands and there is slight lid lag but no exophthalmos. No goitre is palpable.

Thyroid function tests reveal:

Free T4 29.3 pmol/L (10 - 22) Free T3 5.3 pmol/L (3.5 - 5.5)**TSH** <0.02 mU/L (0.4 - 5.0)

Thyroglobulin Undetectable

What is the most likely diagnosis?



Key learning points 🛭



Endocrinology

• Thyroglobulin measurement helps differentiate factious thyrotoxicosis from other diagnosis.

Explanation

All are possible causes but the undetectable thyroglobulin clinches the diagnosis of factitious hyperthyroidism.

thyroglobulin is the precursor of thyroid hormones, therefore if undetectable, indicates an external source of thyroid hormone has been administered.

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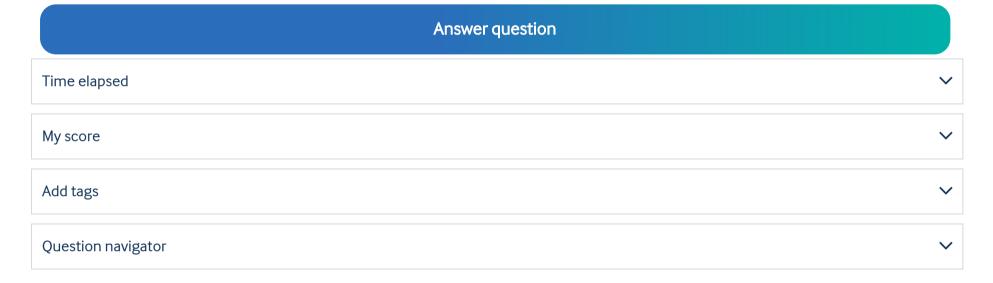
Question 55 of 121

A 42-year-old nurse is found collapsed outside her apartment.

When she is brought to the Emergency department her blood glucose level is found to be 1.9 mmol/L.

What investigations should be performed immediately?

- O Serum calcium and paired serum and urine osmolality
- \bigcirc Glucose tolerance test and HbA_{1c}
- O CT head scan, followed by CT abdomen
- O Paired insulin + growth hormone levels and c-peptide levels
- O Paired insulin + C-peptide levels and blood sulphonylurea levels



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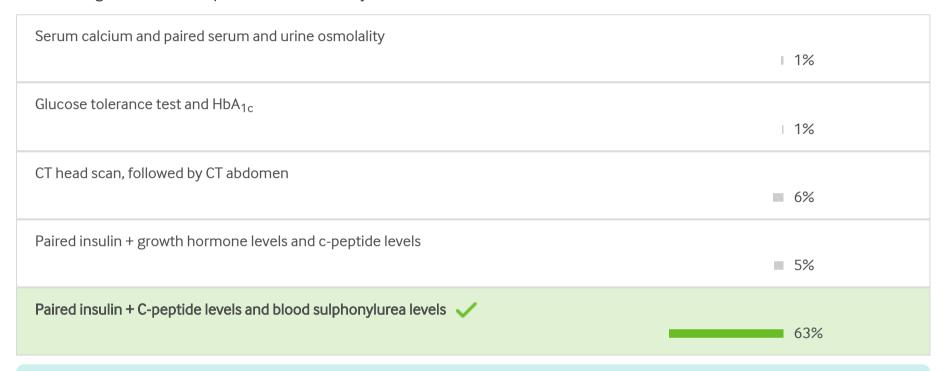
English French



A 42-year-old nurse is found collapsed outside her apartment.

When she is brought to the Emergency department her blood glucose level is found to be 1.9 mmol/L.

What investigations should be performed immediately?



Key learning points 🛭



Endocrinology

• In a case of hypoglycaemia, check paired insulin and c-peptide levels and blood sulphonyl urea levels.

Explanation

Healthcare workers have access to a number of drugs that are not generally available to the public.

These may be self-administered to seek attention, to lose weight or in an attempt to harm themselves.

Abuse of hypoglycaemic agents is not uncommon among healthcare workers and similar scenarios are frequently presented in the MRCP Part 2 written exam.

Next question

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English French

Question 56 of 121

A 55-year-old man was diagnosed with atrial fibrillation and commenced on amiodarone two years ago.

His thyroid function tests prior to commencing amiodarone were normal. He subsequently developed hyperthyroidism whilst on amiodarone.

Amiodarone was stopped four months ago and he was commenced on 40 mg carbimazole OD but he continued to lose weight despite maintaining a good appetite.

His other medications comprised digoxin 250 micrograms OD and warfarin as per INR. There was no family history of thyroid disease. On examination, pulse was 92 beats per minute, irregularly irregular, blood pressure was 130/70 mmHg. There was no goitre palpable on neck examination and he had no visible tremors.

Investigations showed:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.1 mmol/L	(3.5-4.9)
Serum urea	3.8 mmol/L	(2.5-7.5)
Serum creatinine	88 μmol/L	(60-110)
Plasma free T4	56 pmol/L	(10-22)
Plasma free T3	14.2 pmol/L	(5-10)
Plasma thyroid-stimulating hormone	<0.02 mU/L	(0.4-5)
Serum antithyroid peroxidase	12 U/mL	(<50)
TSH receptor antibodies	<1 U/L	(<7)

Radioactive iodine uptake scan (off carbimazole) revealed less than 1% uptake by thyroid gland.

What is the most appropriate management?

\bigcirc	Replacing carbimazole with propylthiouracil
\circ	Observation
\circ	Prednisolone
\circ	Thyroidectomy
\circ	Perchlorate

Answer question Time elapsed My score Add tags

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Radioactive iodine uptake scan (off carbimazole) revealed less than 1% uptake by thyroid gland.

What is the most appropriate management?



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Endocrinology

• Type 2 amiodarone-induced thyrotoxicosis responds to withdrawal of amiodarone and steroids.

Explanation

In this scenario of amiodarone-induced thyroiditis with a low uptake scan suggesting the thyroiditis and type 2 amiodarone-induced thyrotoxicosis.

The initial management of amiodarone induced thyroiditis (AIT) involves deciding whether to discontinue amiodarone therapy. Mild AIT seems to resolve spontaneously in up to 20% of cases when amiodarone is discontinued. Many patients with type 2 AIT become euthyroid within 3-5 months after the discontinuation of amiodarone therapy.

Type 2 AIT is treated with steroids - these have both membrane stabilising effects, anti-inflammatory benefits and reduce conversion of T4 to T3. Prednisolone is given at 30-40mg per day and tapered over a few months until free T4 levels are within acceptable ranges.

Further Reading:

Medscape. Thyroid Dysfunction Induced by Amiodarone Therapy.

Next question

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BMJ On Exam

English French

Question 57 of 121

☆ High impact question

A 22-year-old woman presented with a five year history of hirsutism with her having noticed coarse dark hair under her chin. Being a teacher in a primary school, these symptoms were very distressing for her.

She had tried local measures such as shaving and applying depilatory creams but without lasting success. Her periods are irregular with oligomenorrhoea. She attained menarche at the age of 14 years. She has not yet conceived and has had a coil fitted for contraception. She takes 5 mg diazepam at night.

On examination, she had a BMI of 24 kg/m². She had coarse, dark hair over her chin, lower back and inner thighs. She does not have galactorrhoea to expression and there were no other clinical features of Cushing's syndrome.

Investigations during the follicular phase showed:

Serum androstenedione	10.1 nmol/L	(2 - 10)
Serum dehydroepiandrosterone sulphate	11.6 μmol/L	(2 - 10)
Serum 17-hydroxyprogesterone	5.6 nmol/L	(1 - 10)
Serum oestradiol	220 pmol/L	(200 - 400)
Serum testosterone	3.6 nmol/L	(<3)
Serum sex hormone binding protein	32 nmol/L	(19 - 80)
Plasma luteinising hormone	10.8 U/L	(2.5 - 10)
Plasma follicle-stimulating hormone	3.6 U/L	(2.5 - 10)
Plasma prolactin	980 mU/L	(<500)

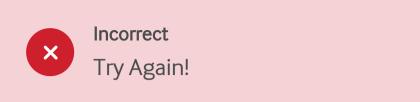
What is the most likely diagnosis?

- O Testosterone producing ovarian tumour
- Microprolactinoma
- Adult onset congenital adrenal hyperplasia
- O Drug induced hyperprolactinaemia
- O Polycystic ovarian syndrome (PCOS)

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



★ High impact question

A 22-year-old woman presented with a five year history of hirsutism with her having noticed coarse dark hair under her chin. Being a teacher in a primary school, these symptoms were very distressing for her.

She had tried local measures such as shaving and applying depilatory creams but without lasting success. Her periods are irregular with oligomenorrhoea. She attained menarche at the age of 14 years. She has not yet conceived and has had a coil fitted for contraception. She takes 5 mg diazepam at night.

On examination, she had a BMI of 24 kg/m^2 . She had coarse, dark hair over her chin, lower back and inner thighs. She does not have galactorrhoea to expression and there were no other clinical features of Cushing's syndrome.

Investigations during the follicular phase showed:

Serum androstenedione	10.1 nmol/L	(2 - 10)
Serum dehydroepiandrosterone sulphate	11.6 μmol/L	(2 - 10)
Serum 17-hydroxyprogesterone	5.6 nmol/L	(1 - 10)
Serum oestradiol	220 pmol/L	(200 - 400)
Serum testosterone	3.6 nmol/L	(<3)
Serum sex hormone binding protein	32 nmol/L	(19 - 80)
Plasma luteinising hormone	10.8 U/L	(2.5 - 10)
Plasma follicle-stimulating hormone	3.6 U/L	(2.5 - 10)
Plasma prolactin	980 mU/L	(<500)

What is the most likely diagnosis?



Key learning points 💡

Endocrinology

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• Follicle-stimulating hormone (FSH) will be normal or low with PCOS while luteinisng hormone (LH) will be elevated.

Explanation

This woman with hirsutism and oligomenorrhoea has mild elevation of androstendione (normal 170HP arguing against congenital adrenal hyperplasia [CAH]) and mild hypertestosternonaemia (together with elevated androstenedione) yet normal oestradiol. These features are most compatible with PCOS.

Follicle-stimulating hormone (FSH) will be normal or low with PCOS while luteinisng hormone (LH) will be elevated. The LH/FSH ratio is normally about 1:1 in premenopausal women, but with PCOS a ratio of greater than 2:1 or 3:1 may be considered diagnostic.

Ten per cent of patients with PCOS have hyperprolactinaemia, the aetiology of which is uncertain. However, this physiological elevation does not suppress oestradiol concentrations as is found with a <u>prolactinoma</u>, where LH/FSH would be suppressed and oestradiol low too.

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BMJ On Exam

English French

Question 58 of 121

A 17-year-old female has blood taken for endocrine testing.

The results are as follows:

LH <1.5 U/L 1.5-6.3

FSH 1.0 U/L 1.0-10.1

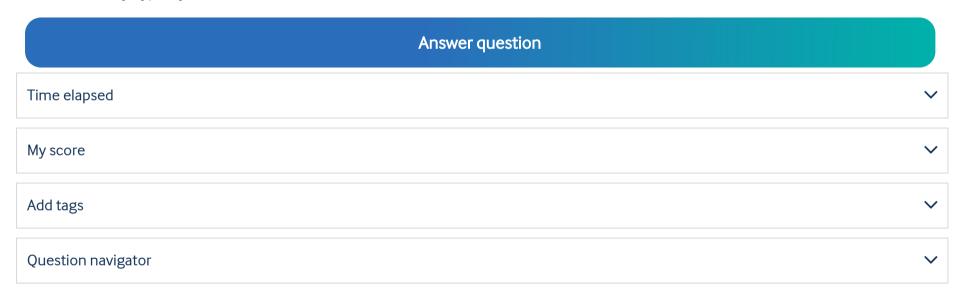
Total T4 170 nmol/L 65-138

Free T4 7.0 pmol/L 10-15

TSH 0.7 mIU/L 0.5-4.5

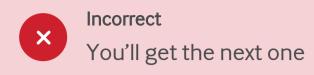
What is the most likely cause of her abnormal thyroid testing?

- Hypopituitarism
- Pregnancy
- O Anorexia nervosa
- Toxic thyroid nodule
- O Primary hypothyroidism



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A 17-year-old female has blood taken for endocrine testing.

The results are as follows:

 LH
 <1.5 U/L</td>
 1.5-6.3

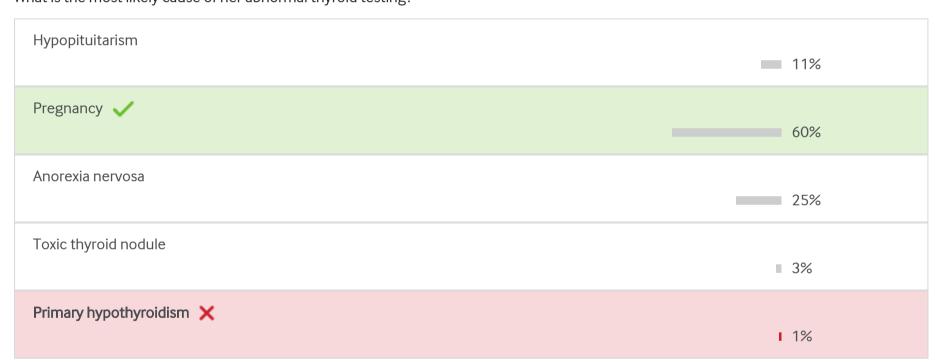
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 1.0 U/L
 1.0-10.1

 Total T4
 170 nmol/L
 65-138

 Free T4
 7.0 pmol/L
 10-15

 TSH
 0.7 mlU/L
 0.5-4.5

What is the most likely cause of her abnormal thyroid testing?



Endocrinology

• Pregnancy blood results show high oestrogen, low luteinising hormone (LH) and follicle-stimulating hormone (FSH) and elevated prolactin and beta-HCG.

Explanation

This patient is clinically euthyroid but exhibits the common changes in thyroid homeostasis seen in pregnancy.

Thyroid binding protein production is increased, possibly due to the action of oestrogen on the liver.

Total tri-iodothyronine (T3) and thyroxine (T4) are also increased in compensation, but free T4 is low, due to the high proportion of the bound fraction.

Thyroid-stimulating hormone (TSH) is often slightly decreased or low-normal, perhaps as a result of hCG being ioncreased during pregnancy.

Other hormonal changes that occur in normal pregnancy include increased cortisol-binding globulin, increased free and total cortisol, and increased aldosterone, prolactin, oestrogen (which can lead to low LH and FSH) and progesterone.

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Anorexia nervosa can be associated with suppressed LH and follicle-stimulating hormone (FSH) but would not account for the high total T4 and low free T4.

<u>Hypopituitarism</u> is associated with low or low-normal TSH and low T4.

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English French

Question 59 of 121

A 15-year-old boy presents to the Emergency Department with polyuria, polydipsia, and chronic headaches. He also states that he has noticed some difficulties with his vision of late. He has no significant past medical history.

On examination, he appears well. His blood pressure is 138/76, pulse is 84bpm and temperature is 36.8°C. Pupils were equal and reactive to light and accommodation, and fundoscopy did not reveal any abnormalities.

Investigations revealed:

Haemoglobin	134 g/L	(130-180)
White cell count	8.0 ×10 ⁹ /L	(4-11)
Platelets	285 ×10 ⁹ /L	(150-400)
Serum sodium	149 /L	(137-144)
Serum potassium	4.1 /L	(3.5-5.0)
Serum urea	4.7 /L	(2.5-7.5)
Serum creatinine	67 Umol/L	(60-110)
Fasting plasma glucose	5.4 mmol/L	(3-6)

Urinalysis pending.

What is the most likely visual field defect in this case?

Superior bitemporal hemianopia
 Left superior quadrantanopia
 Inferior bitemporal hemianopia
 Bi-nasal hemianopia
 Left inferior quadrantanopia

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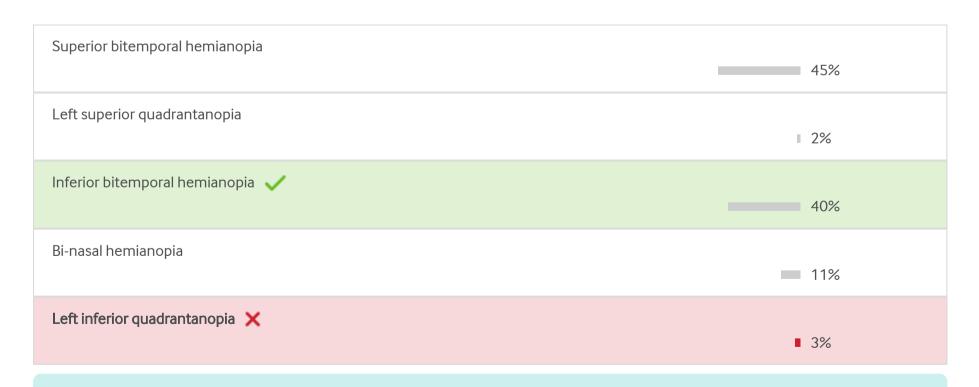
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Fasting plasma glucose	5.4 mmol/L	(3-6)

Urinalysis pending.

What is the most likely visual field defect in this case?



Endocrinology, Ophthalmology

• Craniopharyngioma causes an inferior bitemporal hemianopia and central diabetes insipidus.

Explanation

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This patient has a <u>craniopharyngioma</u> which is causing headaches and central diabetes insipidus.

These benign tumours typically arise in the sellar/suprasellar spurasellar region. They sit above the optic chiasm, and can therefore cause an inferior bitemporal hemianopia.

Superior bitemporal hemianopia would be more commonly seen with pituitary tumours. Inferior quadrantanopia is seen with parietal lobe tumours, while superior quadrantanopia is seen with temporal lobe tumours (Mnemonic = PITS).

References:

Langston, D. (2008). Manual of ocular diagnosis and therapy. Philadelphia: Lippincott Williams & Wilkins.

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Question 60 of 121

☆ High impact question

A 56-year-old woman was referred to hospital by her GP with a three day history of malaise, myalgia, fever and pain in her neck.

Ten days previously she had had a self-limiting upper respiratory tract infection but had not received any antibiotics. She had no significant past medical history and did not take any regular medication.

On examination she appeared anxious and unwell. Temperature 37.9°C, pulse 130 per minute and regular, blood pressure 125/75 mmHg. Heart sounds were normal with no murmurs and her chest was clear. Examination of the abdomen was unremarkable. Neurological examination revealed a fine resting tremor, but was otherwise unremarkable. The thyroid gland was diffusely enlarged and very tender to touch.

Investigations revealed:

Haemoglobin	135 g/L	(115-165)
White cell count	9.3 ×10 ⁹ /L	(4-11)
Platelets	355 ×10 ⁹ /L	(150-400)
ESR (Westergren)	98 mm/1st hour	(0-30)
Plasma T4	220 nmol/L	(58-174)
Plasma T3	188 nmol/L	(1.07-3.18)
Plasma TSH	< 0.05 mU/L	(0.4-5.0)

Which of the following investigations is likely to be most helpful in establishing the diagnosis?

- Blood cultures
 Radioactive iodine uptake scan
 Serum anti-thyroid antibodies
 Fine needle aspiration
- O Ultrasound scan of neck

 Answer question

 Time elapsed

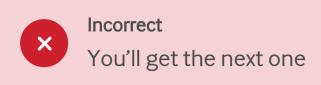
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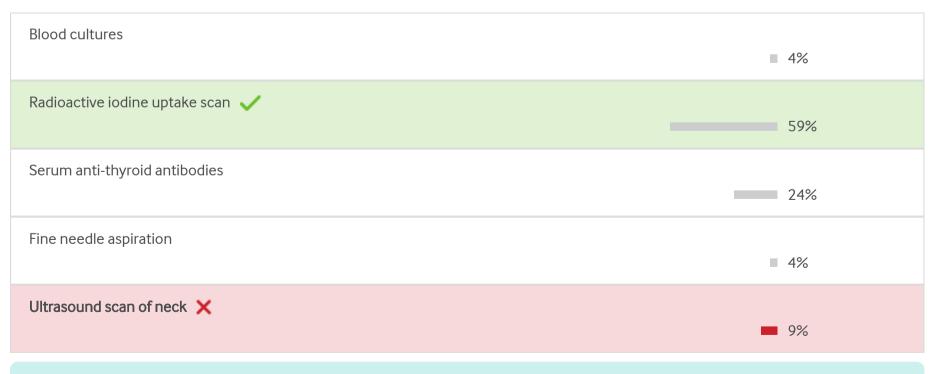
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Plasma TSH	< 0.05 mU/L	(0.4-5.0)

Which of the following investigations is likely to be most helpful in establishing the diagnosis?



Endocrinology

• Radioiodine uptake scan will show reduced uptake in De Quervain's thyroiditis

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Explanation

The patient's symptoms and signs are typical of a diagnosis of subacute thyroiditis, and the likely cause of this is De Quervain's thyroiditis. Radioactive iodine uptake scan is the best investigation for confirming subacute thyroiditis (which can be due to several other aetiologies including Hashimoto's).

De Quervain's thyroiditis (also known as subacute thyroiditis or granulomatous thyroiditis) causes diffuse, tender enlargement of the thyroid gland. The thyroid enlargement is typically rapid, occurring over a period of days.

The syndrome often starts after a respiratory tract infection and it is likely that the condition has a viral aetiology (although no causative infectious agent has been found). Patients feel systemically unwell with myalgia, fever and prostration.

Plasma thyroid hormones are greatly elevated as is the erythrocyte sedimentation rate (ESR). There are often marked signs and symptoms of thyrotoxicosis.

Radioiodine uptake is typically less than 1% at 24 hours (Tc 99m uptake is similarly low).

Treatment is usually bed rest and aspirin to reduce inflammation. Occasionally steroids are used to reduce inflammation.

After the thyroid is depleted of thyroid hormone, patients' serum levels of thyroxine (T4) and tri-iodothyronine (T3) decrease into the hypothyroid range. The hypothyroidism is usually mild but persists for two to four months. A few patients (~5%) remain hypothyroid and need longterm thyroid hormone replacement. Recurrences are uncommon.

Thyroid ultrasound alone is not helpful in distinguishing between abnormalities caused by subacute thyroiditis and other causes of high thyroid hormone levels, including Graves' thyroiditis.

Ultrasound is most useful in assessing discrete nodules.

Fine needle aspiration is most useful when there is a solitary thyroid nodule.

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Question 61 of 121

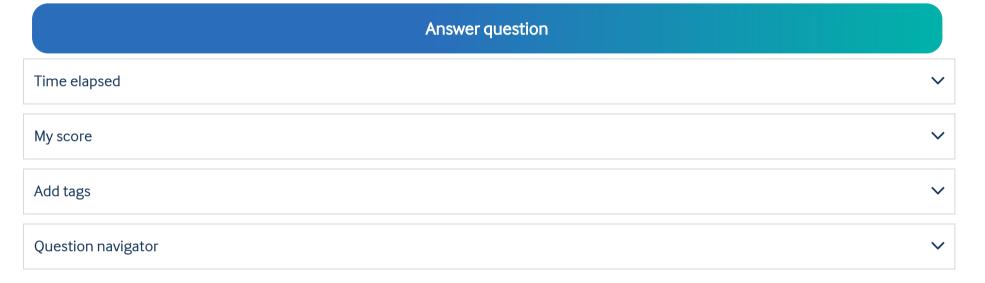
A 60-year-old man with type 2 diabetes is seen for review. He is currently taking maximal doses of metformin and gliclazide. He has previously tried a DPP-4 inhibitor and pioglitazone, and so after discussion, it is agreed to add insulin to his treatment.

His latest Hba1c is 66 mmol/mol. (48 mmol/mol).

He is self-caring and after counselling is competent to self-inject.

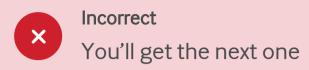
According to NICE guidelines, which of the following would be an appropriate insulin regimen to initiate in this patient?

- O Human isophane insulin once daily
- O Long-acting insulin analogue once daily
- O Biphasic pre-mixed insulin twice daily
- O Basal bolus regimen (intermediate-acting insulin once or twice daily with short-acting insulin around mealtimes three times a day)
- O Short-acting insulin three times a day around meal times



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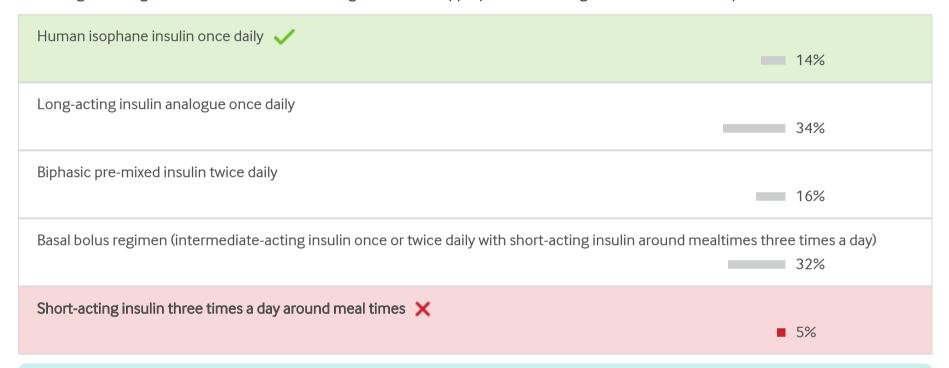


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His latest Hba1c is 66 mmol/mol. (48 mmol/mol).

He is self-caring and after counselling is competent to self-inject.

According to NICE guidelines, which of the following would be an appropriate insulin regimen to initiate in this patient?





Diabetes, Endocrinology

• NICE recommend NPH insulin once or twice daily according to need as the first-line option when initiating insulin in a type 2 diabetic.

Explanation

NICE guidelines advise that, in general, a humane isophane insulin (also referred to as a Neutral Protamine Hagedorn [NPH] insulin) is the first-line recommended insulin to use in a type 2 diabetic. These are intermediate acting insulins usually used once daily at night or twice a day.

The other options in a type 2 diabetic starting insulin are a long-acting insulin analogue or a biphasic 'mixed' preparation. A long-acting insulin analogue might be useful in someone who struggles to inject a twice a day NPH insulin to reduce the frequency of injections to once a day (e.g. someone who requires assistance to inject from a carer or district nurse).

A biphasic 'mixed' preparation is recommended if an individual's diabetic control is especially poor (HbA $_{1c}$ > 75 mmol/mol). In this scenario the patient is OK to self-inject and has an Hba1c significantly below 75 mmol/mol. A NPH/human isophane insulin would be the most appropriate initial insulin choice.

Further reading:

NICE Guidelines: Insulin therapy in type 2 diabetes

Next question

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Question 62 of 121

A 54-year-old woman who is known to have sarcoidosis comes to the clinic complaining of increased thirst, polyuria and nausea. She has recently returned from a foreign holiday to the Spanish riveria, she admits to a passion for soft drinks.

The symptoms of mild shortness of breath and dry cough which she usually gets from her sarcoid are unchanged.

Investigations show:

Haemoglobin	130 g/L	(115-160)
White cell count	8.0 ×10 ⁹ /L	(4-11)
Platelets	229 ×10 ⁹ /L	(150-400)
Sodium	140 mmol/L	(135-146)
Potassium	4.1 mmol/L	(3.5-5)
Creatinine	142 μmol/L (125 last time in clinic)	(79-118)
Calcium	2.95 mmol/L (2.70 last time in the clinic)	(2.21-2.60)

Which of the following is likely to be responsible for the increase in her serum calcium?

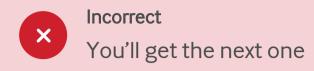
- O Increased sun exposure
- Dehydration
- O Increased alcohol consumption
- O Decreased GFR
- O Increased sarcoid activity

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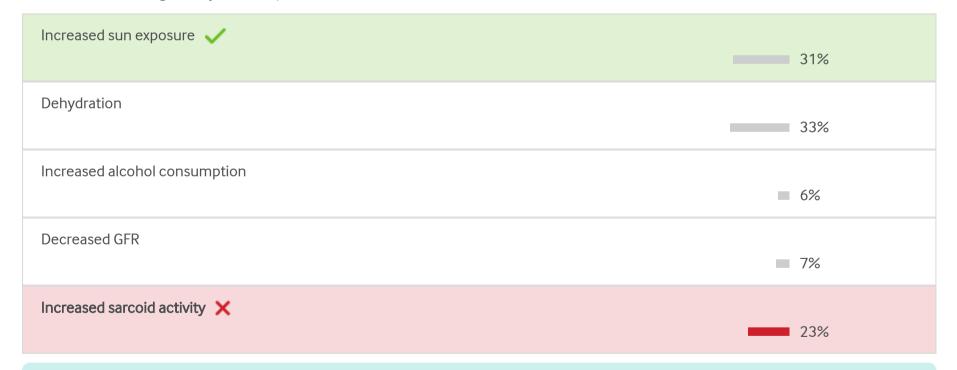
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Creatinine	142 μmol/L (125 last time in clinic)	(79-118)
Calcium	2.95 mmol/L (2.70 last time in the clinic)	(2.21-2.60)

Which of the following is likely to be responsible for the increase in her serum calcium?



Key learning points 🛭

Endocrinology

• Increased sun exposure results in increased vitamin D production.

Explanation

Increased sun exposure results in increased vitamin D production. Patients often drink more cola drinks whilst on holiday, leading to increased phosphate intake. The combination of increased vitamin D and phosphate availability in the presence of <u>sarcoidosis</u> is thought to lead to hypercalcaemia.

The minor change in serum creatinine does not indicate a great enough change in GFR to be responsible for significant changes in serum calcium.

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Equally we have no evidence of dehydration.

Her symptoms of sarcoid are stable, and increased alcohol consumption is not associated with hypercalcaemia.

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Question 63 of 121

☆ High impact question

A 35-year-old man is admitted to the high dependency unit following the de-bulking of a pituitary tumour. Twenty hours following surgery, he is noted to be polyuric and clinically dehydrated.

The following biochemistry results are available:

Urinary specific gravity 1.004

Urinary sodium 40 mmol/L

Urinary osmolality 185 mOsm/kg

Plasma sodium 153 mmol/L

Plasma osmolality 309 mOsmol/kg

What is the most likely diagnosis?

- O Central diabetes insipidus
- O Inappropriate secretion of antidiuretic hormone (SIADH)
- O Furosemide-induced diuresis
- Mannitol-induced diuresis
- Cerebral salt wasting syndrome

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☆ High impact question

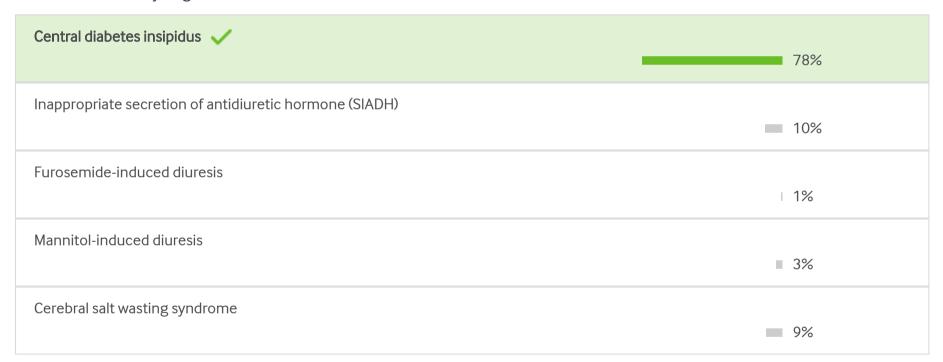
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The following biochemistry results are available:

Urinary specific gravity 1.004 Urinary sodium 40 mmol/L Urinary osmolality 185 mOsm/kg Plasma sodium 153 mmol/L

309 mOsmol/kg Plasma osmolality

What is the most likely diagnosis?



Key learning points 💡



Critical Care, Endocrinology

• Diabetes insipidus is an important complication of neurosurgery; diagnosis requires an understanding of urinary and serum sodium biochemistry.

Explanation

Central diabetes insipidus (DI) results from the failure of antidiuretic hormone (ADH) release from the pituitary, resulting in a diuresis of dilute urine. The inappropriate water loss can lead to a high serum sodium concentration and a state of clinical dehydration. DI is associated with subarachnoid haemorrhage, traumatic brain injury, and pituitary surgery.

Biochemically, DI can be diagnosed by:

- urine osmolality <200 mOsm/kg
- urinary [Na] 20-60 mmol/L
- plasma osmolality >305 mOsmol/kg

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- serum [Na] >145 mmol/L, and
- urinary specific gravity <1.005.

Treatment includes increasing oral water intake. In the unconscious patient, nasogastric water and/or intravenous 5% dextrose can be administered. Synthetic ADH can be given intranasally or intravenously if the urine output continues to be greater than 250 ml/hr.

Cerebral salt wasting syndrome causes polyuria and dehydration secondary to urinary sodium losses, but it is also characterised by hyponatraemia and a serum osmolality < 280 mOsm/kg, which is not present in this patient.

Furosemide-induced diuresis is associated with a serum [sodium] <135 mmol/L and a serum osmolality <280 mOsmol/kg.

Inappropriate secretion of antidiuretic hormone (SIADH) can follow brain injury and results from an inappropriately high ADH, but patients are not polyuric and the biochemical picture is one of https://pxp.natraemia (<135 mmol/L) and low serum osmolality (<280 mOsmol/L).

Mannitol-induced diuresis should not be selected as although mannitol causes polyuria and a high serum osmolality (>305 mOsmol/L), it is associated with a low serum sodium (<135 mmol/L) that is not seen in this patient's plasma biochemistry.

Reference:

Bradshaw K, Smith M. Disorders of sodium balance after brain injury. Contin Educ Anaesth Crit Care Pain. 2008;8:129-133.

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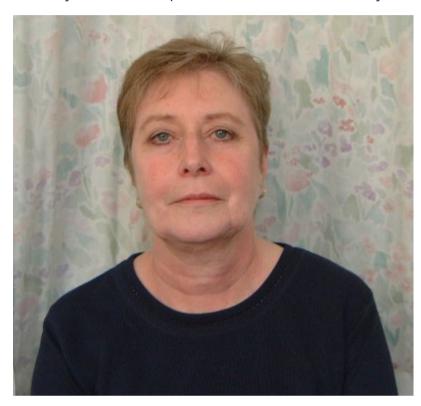
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English French

Question 64 of 121

This 56-year-old female presents with a six month history of weight loss and sweats.



Examination reveals the appearances as shown, a pulse of 98 beats per minute and blood pressure is 120/70 mmHg.

Investigations show:

 T4
 25.3 pmol/L
 (10-22)

 TSH
 4.5 mU/L
 (0.4-5)

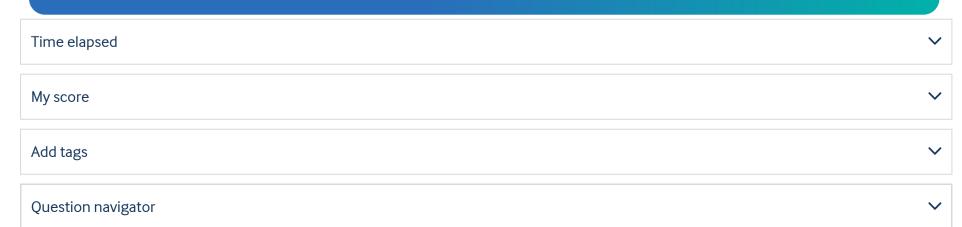
 T3
 12 pmol/L
 (5-10)

 Alpha subunit
 11 ng/mL
 (<2.5)</td>

Which of the following investigations would be most appropriate?

- CT ovaries
- MRI head scan
- O Beta-HCG concentration
- \bigcirc 123 I Thyroid uptake scan
- O Short Synacthen test

Answer question



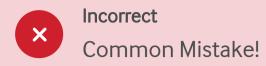
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Investigations show:

T4	25.3 pmol/L	(10-22)
TSH	4.5 mU/L	(0.4-5)
Т3	12 pmol/L	(5-10)
Alpha subunit	11 ng/mL	(<2.5)

Which of the following investigations would be most appropriate?

CT ovaries	6%
MRI head scan 🗸	24%
Beta-HCG concentration	14%
¹²³ l Thyroid uptake scan	49%
Short Synacthen test 🗶	= 7%

Key learning points Photographic

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• Non-suppressed TSH with elevated alpha subunit is in keeping with TSH-oma

Explanation

This patient has secondary hyperthyroidism with elevated tri-iodothyronine (T3) and thyroxine (T4) and inappropriately *normal* TSH. If free T4 and T3 are high, but TSH is normal or high, a pituitary MRI should be done to look for a pituitary mass (TSH-secreting adenoma). If there is no pituitary mass, but there is end-organ evidence of hyperthyroidism, a careful family pedigree should be obtained as well as genetic testing for the possibility of thyroid hormone resistance.

In this case an MRI head scan may be expected to demonstrate a pituitary macroadenoma.

Alpha subunit is also secreted in large amounts and measurement of this should yield an elevated alphaSU:TSH ratio (usually 1:1).

The diagnosis should be suspected when TSH concentrations are not suppressed in the presence of hyperthyroidism.

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English French

Question 65 of 121

A 64-year-old woman with a history of diabetic nephropathy is referred to the rheumatology clinic after suffering a left Colles' fracture. Current medication for diabetes includes linagliptin; she also takes Ramipril and atorvastatin to manage hypertension and for primary cardiovascular prevention.

On examination her BP is 138/82, pulse is 70 and regular. Her BMI is 27. The cast has been removed from her wrist and there is minimal residual deformity. You are considering starting her on bisphosphonate therapy. Routine bloods reveal a normal range calcium and phosphate and an HbA_{1c} of 58 mmol/mol, (<53).

With respect to GFR, which level would contraindicate bisphosphonate therapy?

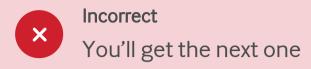
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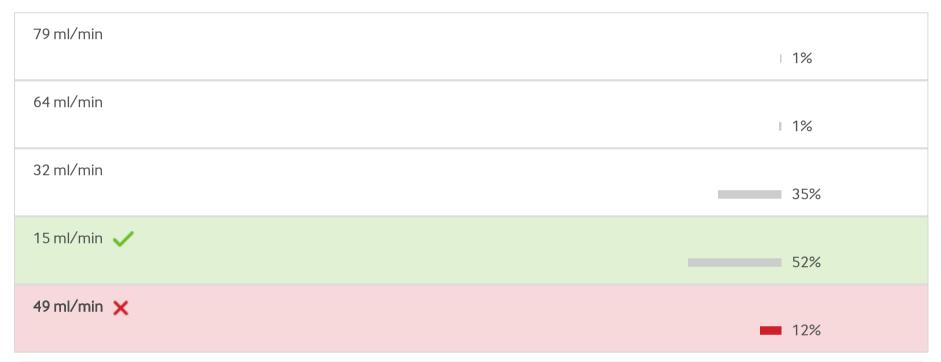
English French



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With respect to GFR, which level would contraindicate bisphosphonate therapy?



Endocrinology

• Use of bisphosphonates and GFR.

Explanation

The answer is A), 15 ml/min. Data from randomised controlled trials supports use of bisphosphonates down to GFRs as low as 30-35 ml/min. Below this level RCT evidence is unavailable, and the risk of adynamic bone disease associated with renal impairment is significantly elevated. As such for patients with CKD 4 or 5, specialist referral/advice from a renal physician on appropriate therapy is advised. In the first instance PTH is measured, although secondary hyperparathyroidism is only treated in the event that PTH is more than twice the upper limit of the normal range.

The other options, (B to E), are above the range at which bisphosphonates have been studied in RCTs, and above GFR of 30 ml/min the risk of adynamic bone disease is diminished. Hence all of these options are incorrect. Type 2 diabetes mellitus per se is recognised to increase the risk of osteoporotic bone fracture, in contrast to obesity without elevated blood glucose, which is associated with increased bone mineral density.

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Question 66 of 121

☆ High impact question

A 23-year-old female presents with weight gain and a four month history of amenorrhoea.

Examination reveals a BMI of 33 and mild hirsuitism.

Investigations reveal:

Serum oestradiol	1200 pmol/L	(130-800)
Serum testosterone	2.8 nmol/L	(<3.0)
Serum prolactin	1500 mU/L	(50-450)
Serum LH	1.2 U/L	(1.2-8.0)
Serum FSH	1.5 U/L	(1.5-8.0)

What is the most likely diagnosis?

- Pregnancy
- Ovarian tumour
- O Polycystic ovarian syndrome (PCOS)
- Prolactinoma
- O Cushing's syndrome

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☆ High impact question

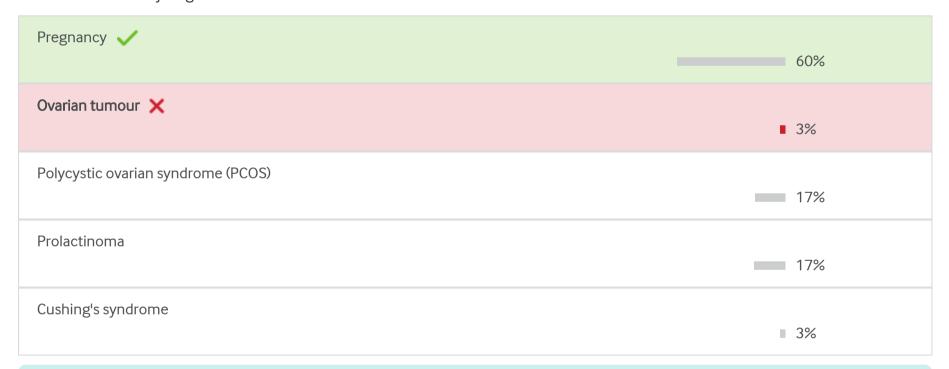
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Serum FSH	1.5 U/L	(1.5-8.0)

What is the most likely diagnosis?



Endocrinology

• Raised oestradiol with raised prolactin and low LH/FSH is likley due to pregnancy

Explanation

The patient has elevated oestradiol with suppressed luteinising hormone/follicle-stimulating hormone (LH/FSH) and an elevated prolactin concentration.

With the recent amenorrhoea the most likely diagnosis is pregnancy.

A <u>prolactinoma</u> would cause hypogonadotrophic hypogonadism as would Cushing's syndrome.

In PCOS, neither prolactin nor oestradiol would be this high and the LH to FSH ratio would classically be elevated.

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Question 67 of 121

A 45-year-old female presents feeling unwell with weight loss, throat pains and palpitations.

These symptoms have developed over the last two weeks and she has lost approximately 3 kg in weight. There is no other past medical history of note. She is a smoker of 10 cigarettes per day and drinks approximately 10 units of alcohol weekly. She is employed as a cleaner. Of note in her family history is a maternal grandmother who receives treatment for an underactive thyroid.

On examination she has a temperature of 37.5°C, a fine tremor of the outstretched hands, a pulse of 98 beats per minute regular and a blood pressure of 120/80 mmHg. She has evidence of lid lag but no exophthalmos. Examination of her neck reveals a tender goitre but no palpable lymphadenopathy. No bruit is audible over the goitre. Auscultation of the heart and lungs are both normal and no masses are palpable on abdominal examination.

Investigations reveal:

Haemoglobin	145 g/L	(115-165)
White cell count	7.9 ×10 ⁹ /L	(4-11)
ESR (Westergren)	88 mm/1st hour	(0-20)
Serum sodium	139 mmol/L	(137-144)
Serum potassium	4.2 mmol/L	(3.5-4.9)
Serum urea	6.4 mmol/L	(2.5-7.5)
Serum creatinine	105 μmol/L	(60-110)
Serum calcium	2.32 mmol/L	(2.2-2.6)
Free T4	45.4 pmol/L	(10-22)
TSH	0.05 mU/L	(0.4-5)
Anti thyroid peroxidase antibody	Positive	-
What is the most likely diagnosis?		
O Riedel's thyroiditis		
O Papillary thyroid cancer		
O Graves' disease		

Answer question V

DeQuervain's (subacute) thyroiditis

Hashimoto's thyrotoxicosis

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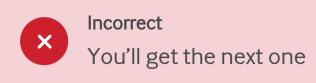
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English French



A 45-year-old female presents feeling unwell with weight loss, throat pains and palpitations.

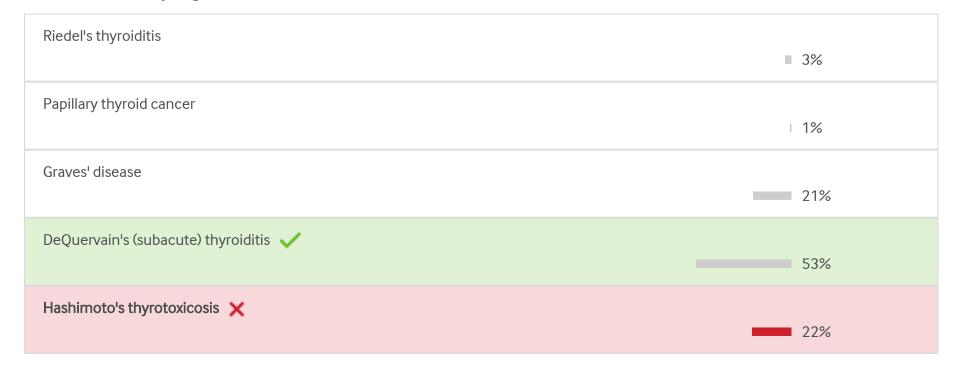
These symptoms have developed over the last two weeks and she has lost approximately 3 kg in weight. There is no other past medical history of note. She is a smoker of 10 cigarettes per day and drinks approximately 10 units of alcohol weekly. She is employed as a cleaner. Of note in her family history is a maternal grandmother who receives treatment for an underactive thyroid.

On examination she has a temperature of 37.5°C, a fine tremor of the outstretched hands, a pulse of 98 beats per minute regular and a blood pressure of 120/80 mmHg. She has evidence of lid lag but no exophthalmos. Examination of her neck reveals a tender goitre but no palpable lymphadenopathy. No bruit is audible over the goitre. Auscultation of the heart and lungs are both normal and no masses are palpable on abdominal examination.

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Free T4	45.4 pmol/L	(10-22)
TSH	0.05 mU/L	(0.4-5)
Anti thyroid peroxidase antibody	Positive	-

What is the most likely diagnosis?



Endocrinology

• DeQuervain's thyroiditis is associated with painful gland, raised ESR and acute illness

Explanation

The salient features of this patient are the relatively acute onset of the illness with temperature, thyrotoxicosis, tender goitre and elevated erythrocyte sedimentation rate (ESR) which all point to a diagnosis of DeQuervain's thyroiditis.

The high ESR would argue against a diagnosis of Hashimoto's or Graves'. You may argue that the thyroid peroxidase (TPO) antibodies (abs) would favour Hashimoto's or hashitoxicosis or Graves', but it matters not a jot. In fact TPOAb may be found in association with Graves', Hashimoto's or De Quervain's. It is a feature of DeQuervain's that the ESR is this elevated and that the goitre is tender.

DeQuervain's or subacute thyroiditis is a disease of unknown aetiology which is associated with inflammation of the thyroid follicles (thyroiditis) causing a liberation of their contents (thyrotoxicosis) which is often transient. A radio-iodine uptake scan usually shows minimal or zero uptake.

The condition is treated with steroids and/or beta-blockers.

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BMJ On Exam

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Question 68 of 121

☆ High impact question

A 38-year-old woman presents to the clinic for review.

She has noticed a hard nodule on the left side of her neck a few weeks earlier, she first spotted it whilst putting on a new necklace preparing for a night out. There is no past medical history of note.

On examination her BP is 112/72 mmHg, pulse is 65 and regular. There is clearly a hard nodular area over the left thyroid and you suspect it is an underlying carcinoma.

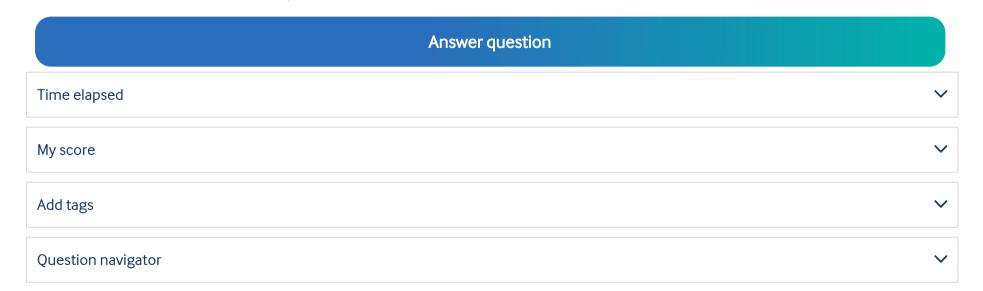
Investigations show:

Haemoglobin	127 g/L	(115 - 160)
White cell count	6.0 ×10 ⁹ /L	(4 - 11)
Platelets	200 ×10 ⁹ /L	(150 - 400)
Sodium	138 mmol/L	(135 - 146)
Potassium	3.9 mmol/L	(3.5 - 5)
Creatinine	110 μmol/L	(79 - 118)
TSH	0.8 IU	(0.5 - 5)

Fine needle aspiration biopsy - Large thyrocytes, abnormal nuclei and cytoplasm with several mitoses. Psammoma bodies identified.

Which of the following is the most likely diagnosis?

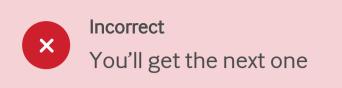
\bigcirc	Follicular carcinoma of the thyroid
\circ	Papillary carcinoma of the thyroid
\circ	Hurthle cell carcinoma of the thyroic
\circ	Medullary carcinoma of the thyroid
\bigcirc	Anaplastic carcinoma of the thyroid



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★ High impact question

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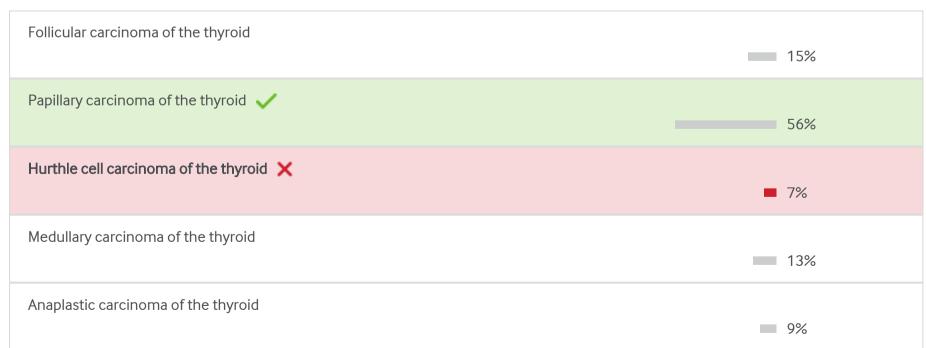
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Creatinine	110 μmol/L	(79 - 118)
TSH	0.8 IU	(0.5 - 5)

Fine needle aspiration biopsy - Large thyrocytes, abnormal nuclei and cytoplasm with several mitoses. Psammoma bodies identified.

Which of the following is the most likely diagnosis?



Key learning points 🛭



Endocrinology

• Papillary carcinoma of the thyroid is the commonest type of thyroid cancer, large thyrocytes and psammoma bodies are features typically seen on histology.

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Explanation

Papillary carcinoma of the thyroid is the commonest type of <u>thyroid cancer</u>, large thyrocytes and psammoma bodies are features typically seen on histology. Abnormalities are often multi-focal, with local spread via lymphatics being seen.

Anaplastic carcinoma of the thyroid is rapidly growing and occurs most commonly in the elderly.

Medullary carcinoma occurs in conjunction with MEN2, and we have no other features suggestive of the MEN syndrome here.

Follicular thyroid carcinoma is the second most common, occurring in only 10% of patients versus 80% for papillary carcinoma.

Hurthle cell carcinomas make up 2-5% of the total thyroid cancer burden.

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English French

Question 69 of 121

A 62-year-old man with a history of type 2 diabetes comes to the clinic for review.

He is currently taking a basal bolus insulin regime and metformin. He has proteinuria for which he currently takes ramipril 10 mg daily and furosemide 80 mg.

On examination his BP is 155/82 mmHg, pulse is 82 and regular. There is bilateral peripheral pitting oedema.

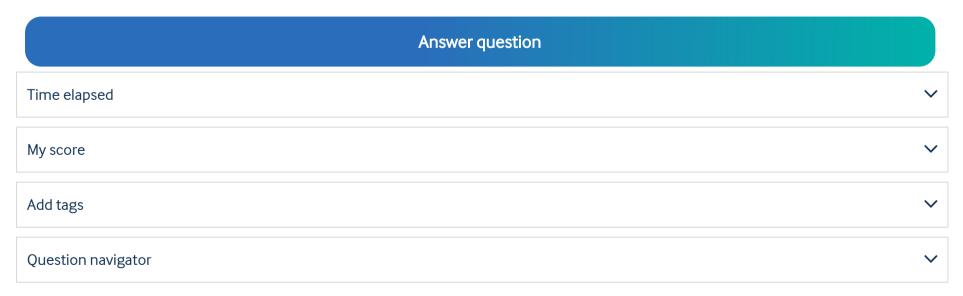
Investigations show:

Hb 119 g/L (135-177) WCC 8.0×10^9 /L (4-11) PLT 198 $\times 10^9$ /L (150-400) Na 138 mmol/L (135-146) K 5.2 mmol/L (3.5-5.0) Cr 140 μmol/L (79-118)

Twenty four hour urinary protein excretion 5.4 g.

Which of the following is the therapy change most likely to reduce his proteinuria?

- AmlodipineBendroflumethiazideDoxazosin
- Increased furosemide
- Spironolactone



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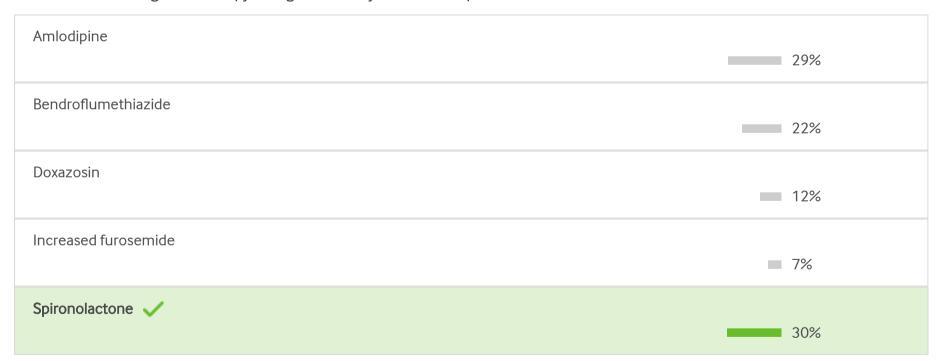
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Cr	140 μmol/L	(79-118)

Twenty four hour urinary protein excretion 5.4 g.

Which of the following is the therapy change most likely to reduce his proteinuria?



Key learning points 🛭

Endocrinology

• Addition of aldosterone antagonist therapy to ACE inhibition further impacts to reduce proteinuria in diabetic renal disease.

Explanation

Addition of aldosterone antagonist therapy to ACE inhibition further impacts to reduce proteinuria in diabetic renal disease. It may however worsen hyperkalaemia, and for this reason close monitoring of urea and electrolytes is required after commencing therapy.

A small reduction in glomerular filtration rate (GFR) is also seen during the first 12 weeks after commencement of therapy.

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Whilst alpha blockers and calcium channel antagonists may impact on blood pressure, they do not significantly reduce proteinuria.

Furosemide reduces salt and water overload but also does not impact on proteinuria.

Bendroflumethiazide is best avoided in this situation if possible, as it may lead to significant hyponatraemia.

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Question 70 of 121

A 30-year-old woman presents with a two week history of feeling generally unwell, a 3 kg weight loss and suffering palpitations. She has otherwise been very well.

The only medication that she receives is an oral contraceptive. She is a non-smoker and drinks approximately 14 units of alcohol weekly. She is employed as an auxillary nurse and is single.

On examination she is apyrexial with a pulse of 98 beats per minute regular and a blood pressure of 124/80 mmHg and a BMI of 24.5 kg/m². She has a slight tremor of the outstretched hands but no eye signs. She is noted to have a tender modestly enlarged goitre, with no audible bruit. No other abnormalities are noted.

Investigations reveal:

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 \bigcirc

Silent thyroiditis

Graves' disease

Full blood count	Normal	-
Urea and electrolytes	Normal	-
Glucose	5.5 mmol/L	(3.0-6.0)
ESR	50 mm/hr	(1-10)
Free tyroxine	27.9 pmol/L	(10-22)
TSH	0.02 mU/L	(0.4-5)
Thyroid peroxidase antibody	Negative	-
What is the most likely diagnosis?		
 Hashitoxicosis 		

○ Reidel's thyroiditis ○ DeQuervain's thyroiditis Answer question Time elapsed ✓ My score Add tags ✓ Question navigator

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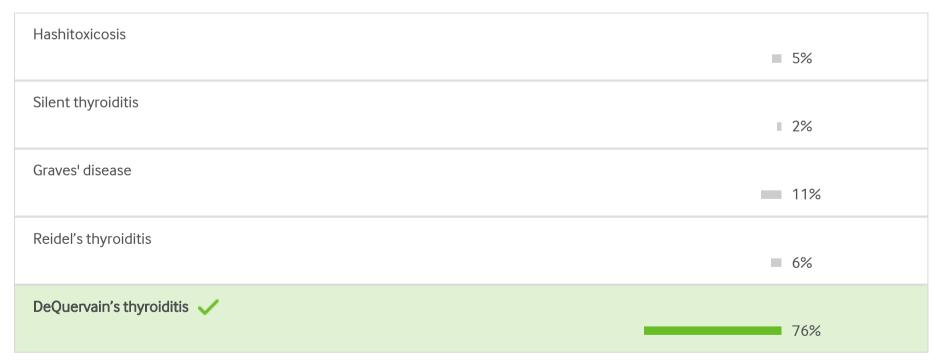
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Investigations reveal:

Full blood count	Normal	-
Urea and electrolytes	Normal	-
Glucose	5.5 mmol/L	(3.0-6.0)
ESR	50 mm/hr	(1-10)
Free tyroxine	27.9 pmol/L	(10-22)
TSH	0.02 mU/L	(0.4-5)
Thyroid peroxidase antibody	Negative	-

What is the most likely diagnosis?



Key learning points 🛭

Diagnosis, Endocrinology, Thyroid

• DeQuervain's thyroiditis presents with elevated erythrocyte sedimentation rate (ESR), weight loss and tender goitre and should be treated with analgesia..

Explanation

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This patient has typical symptoms of DeQuervain's thyroiditis with elevated erythrocyte sedimentation rate (ESR), weight loss and tender goitre.

Treatment relies upon simple analgesia although sometimes betablockers for the mild hyperthyroidism can help. In more extreme cases steroids are used.

The negative autoantibody argues against this being an autoimmune thyroidits such as hashitoxicosis or Graves' disease.

Silent thyroiditis usually occurs after pregnancy and is associated with non-tender goitre and normal inflammatory markers.

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English French

Question 71 of 121

A 66-year-old female was admitted with nausea and vomiting of two days duration.

She and her husband had eaten a take away meal and had both become ill. However, her husband a had recovered after a day. Otherwise she had been fit and well except for hypertension for which she took amlodipine 5 mg daily.

On examination she appeared comfortable, with a temperature of 36.5°C, a pulse of 90 beats per minute regular and a blood pressure of 146/98 mmHg. No other abnormalities were noted.

Investigations revealed:

Sodium	146 mmol/L	(137-144)
Potassium	3.5 mmol/L	(3.5-4.9)
Urea	10.2 mmol/L	(2.5-7.5)
Creatinine	142 μmol/L	(60-110)
Corrected calcium	3.01 mmol/L	(2.2-2.6)
Phosphate	0.7 mmol/L	(0.8-1.4)
Alkaline phosphatase	110 U/L	(45-105)
Aspartate transaminase	25 U/L	(1-31)
Alanine transaminase	31 U/L	(5-35)

What is the best treatment for this patient?

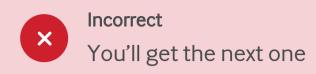
- O IV 0.45% sodium chloride
- Haemodialysis
- O IV 0.9% sodium chloride
- O IV pamidronate
- O IV 5% dextrose

Answer question Time elapsed My score Add tags Question navigator

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A 66-year-old female was admitted with nausea and vomiting of two days duration.

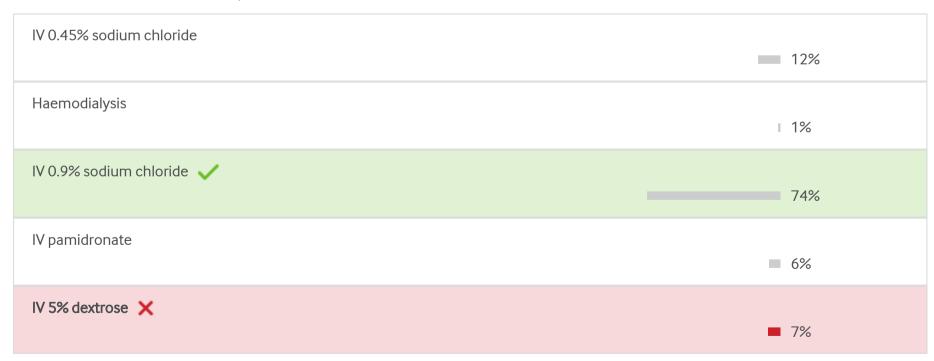
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Alanine transaminase	31 U/L	(5-35)

What is the best treatment for this patient?



Endocrinology

• Normal saline is usually the first line in the management of hypercalcaemia even in the presence of normal or slightly raised serum sodium levels.

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Explanation

This patient is dehydrated due to gastroenteritis and has a moderate hypercalcaemia and is likely to have overall sodium deficiency. However, there is intravascular volume concentration with a slightly raised sodium level making this quite a challenging problem.

The most appropriate management is with 0.9% sodium chloride. If the sodium level were 150 or above an initial treatment would be with 0.45% sodium chloride reverting to 0.9% sodium chloride when the sodium concentration fell below 150.

This manoeuvre would be likely to produce a fall in her calcium concentration which, in conjunction with hypertension and hypophosphataemia, is likely to be due to primary hyperparathyroidism.

Hyperparathyroidism is usually asymptomatic and often picked up through routine biochemistry.

Appropriate investigation of her hypercalcaemia would include measurement of parathyroid hormone (PTH) which would be within the normal range (inappropriately normal) or high.

Next question

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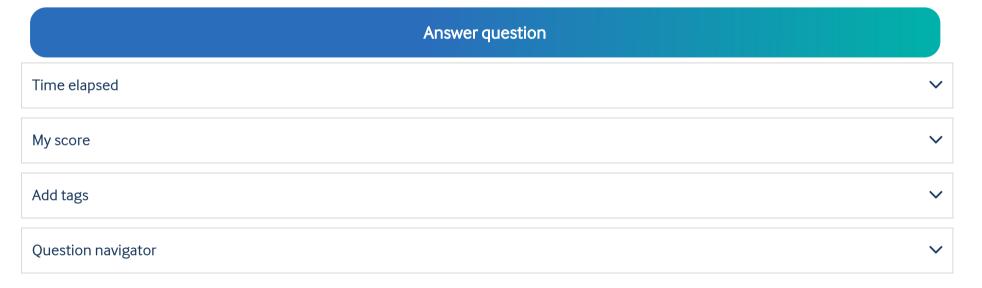
Question 72 of 121

An 80-year-old female presents to the Emergency Department acutely unwell after being found unresponsive, on the floor of her house, by her son. She had a past history of hypothyroidism and of taking thyroxine daily. However, her compliance with treatment is questionable.

On examination she was unrousable with a Glasgow Coma Scale of 6/15, had a central temperature of 34°C, oxygen saturations of 95% on air, a pulse of 44 beats per minute and a blood pressure of 100/80 mmHg. There were no specific localising signs on neurological examination, but both plantars were extensor.

Prior to results of her emergency blood tests being available, what is the most appropriate immediate treatment for this patient?

- Oral thyroxine via NG tube
- O Intravenous thyronine (T3) and hydrocortisone
- O Intravenous hydrocortisone
- O Intravenous 50% glucose
- Intravenous normal saline



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An 80-year-old female presents to the Emergency Department acutely unwell after being found unresponsive, on the floor of her house, by her son. She had a past history of hypothyroidism and of taking thyroxine daily. However, her compliance with treatment is questionable.

On examination she was unrousable with a Glasgow Coma Scale of 6/15, had a central temperature of 34°C, oxygen saturations of 95% on air, a pulse of 44 beats per minute and a blood pressure of 100/80 mmHg. There were no specific localising signs on neurological examination, but both plantars were extensor.

Prior to results of her emergency blood tests being available, what is the most appropriate immediate treatment for this patient?



Key learning points 🛭



Emergency Medicine, Endocrinology

• Myxoedema coma is a medical emergency requiring treatment with intravenous thyroxine and hydrocortisone.

Explanation

This patient has typical features of myxoedema coma, which usually occurs in the elderly who are typically non-compliant. It carries a high mortality and should initially be treated with IV thyroid hormone - either T4 or T3 - and IV hydrocortisone even before results are obtained.

Other treatment includes rewarming. IV fluids should be used cautiously, as these patients are typically fluid overloaded.

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Question 73 of 121

A 35-year-old woman is referred to the clinic for evaluation of her blood pressure.

She is currently treated with ramipril 10 mg daily and amlodipine 10 mg daily. She is having headaches nearly every morning which are increasingly severe.

On examination her BP is 155/100 mmHg, pulse is 80 and regular. You are suspicious there may be a thyroid mass on examination of her neck. Her chest is clear, abdominal examination is unremarkable, her BMI is 23.

Investigations show:

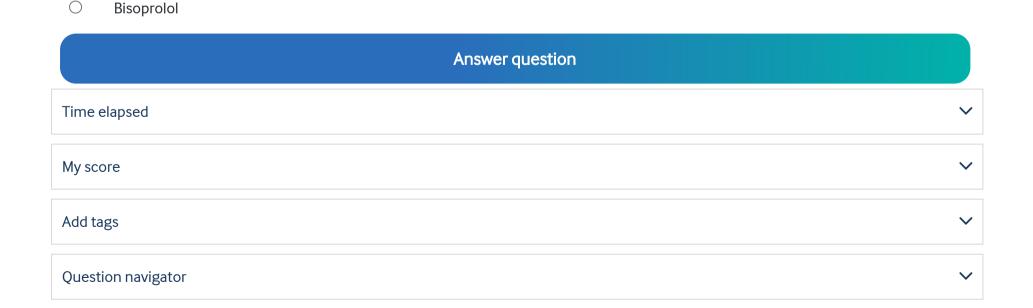
Haemoglobin	130 g/L	(115-160)
White cell count	8.1 ×10 ⁹ /L	(4-11)
Platelets	218 ×10 ⁹ /L	(150-400)
Sodium	139 mmol/L	(135-146)
Potassium	3.6 mmol/L	(3.5-5)
Creatinine	123 μmol/L	(79-118)
Calcium	2.92 mmol/L	(2.21-2.60)

Which of the following is the most appropriate additional medication to control her blood pressure?

\circ	Prazosin
\bigcirc	Indapamide
\bigcirc	Phenoxybenzamin

Atenolol

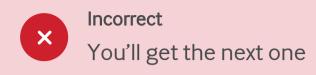
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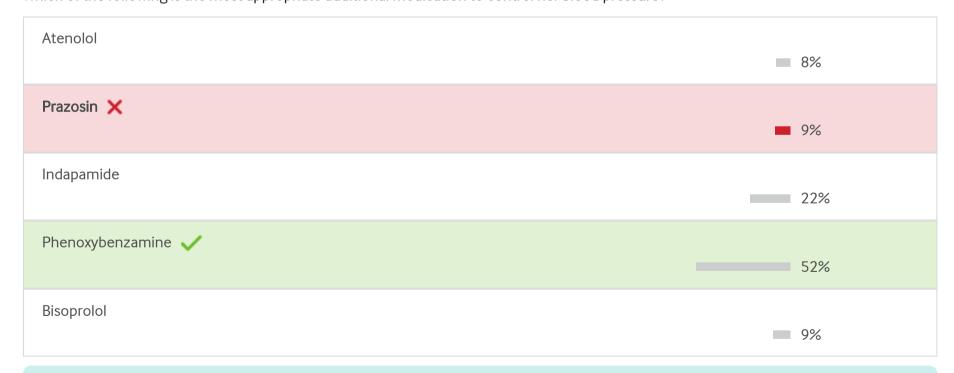
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Potassium	3.6 mmol/L	(3.5-5)
Creatinine	123 μmol/L	(79-118)
Calcium	2.92 mmol/L	(2.21-2.60)

Which of the following is the most appropriate additional medication to control her blood pressure?



Endocrinology

• Full alpha blockade prior to beta blockade with an agent such as phenoxybenzamine is recommended to control blood pressure initially in suspected phaeochromocytoma.

Explanation

This patient has very poorly controlled blood pressure and is only 35 years of age.

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The hypercalcaemia and thyroid mass are suggestive of multiple endocrine neoplasia type 2 (MEN-2) with an underlying phaeochromocytoma.

In this case full alpha blockade with an agent such as phenoxybenzamine is essential whilst investigations are undertaken to rule out medullary thyroid carcinoma (as part of MEN) as a cause of her hypercalcaemia.

Beta blockade without first alpha blocking raises the possibility of rebound hypertension due to unopposed action of the alpha vasoconstrictors; as such it is inadvisable to consider bisoprolol or atenolol.

Prazosin will not achieve adequate alpha blockade, and thiazide therapy is likely to be ineffective in managing phaeochromocytoma.

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Question 74 of 121

☆ High impact question

A 29-year-old woman presents to the clinic with no periods for the past six months. She has also suffered a loss of libido and problems with intercourse with her partner.

There is no other past medical history of note and she takes no medication. On examination her BP is 122/84 mmHg, pulse is 72, her BMI is 23.

Investigations show:

НЬ	127 g/L	(11.5-16.0)
WCC	6.3 ×10 ⁹ /L	(4-11)
PLT	168 ×10 ⁹ /L	(150-400)
Na	138 mmol/L	(135-146)
K	4.2 mmol/L	(3.5-5.0)
Cr	90 μmol/L	(79-118)
FSH	40 U/L	(<15)
Prolactin	200 mU/L	(<450)

Pregnancy test negative.

 \bigcirc

Which of the following is the most likely diagnosis?

Androgen insensitivity syndrome

ProlactinomaPremature ovarian failurePolycystic ovarian syndrome

Pituitary failure

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☆ High impact question

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Cr	90 μmol/L	(79-118)
FSH	40 U/L	(<15)
Prolactin	200 mU/L	(<450)

Pregnancy test negative.

Which of the following is the most likely diagnosis?



Key learning points 🛭

Endocrinology

• In premature ovarian failure Patients should be counselled with respect to appropriate hormone replacement to protect against osteoporotic fracture and about likely infertility.

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Explanation

The follicle-stimulating hormone (FSH) above the range for diagnosis of menopause suggests premature ovarian failure. This may be autoimmune in origin and fertility only rarely returns. Patients should be counselled with respect to appropriate hormone replacement to protect against osteoporotic fracture and about likely infertility.

This patient had a previously normal menstrual cycle; as such androgen insensitivity syndrome is an impossibility.

The fact that urea and electrolytes are normal and she is otherwise well, make pituitary failure unlikely.

There are no features of polycystic ovarian syndrome (PCOS) and the BMI is in the normal range.

Prolactin is in the normal range.

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Question 75 of 121

A 49-year-old lady was seen in the outpatient clinic with a four week history of diarrhoea and weight loss. There was no past history of note and she was not taking any regular prescribed medications.

On examination she appeared well. A smooth, diffusely enlarged mass was palpable over the trachea; the mass moved upwards on swallowing. Her pulse was 100 beats per minute, regular. Blood pressure was 135/60 mmHg. Her abdomen was soft and non-tender with active bowel sounds. A fine tremor was noted.

Investigations showed:

Serum sodium	139 mmol/L	(137-144)
Serum potassium	4.1 mmol/L	(3.5-4.9)
Serum urea	3.2 mmol/L	(2.5-7.5)
Serum creatinine	89 μmol/L	(60-110)
Plasma T4	55 nmol/L	(58-174)
Plasma free T4	9 pmol/L	(10-22)
Plasma TSH	<0.2 mU/L	(0.4-5.0)
Plasma thyroid binding globulin	22 mg/L	(13-28)

 $\label{lem:reason} \mbox{Radioactive iodine uptake was found to be increased.}$

What is the most likely diagnosis?

- DeQuervain's thyroiditisHashimoto's thyroiditisT3 thyrotoxicosis
- O Liothyronine-induced factitious thyrotoxicosis
- Sick euthyroid syndrome

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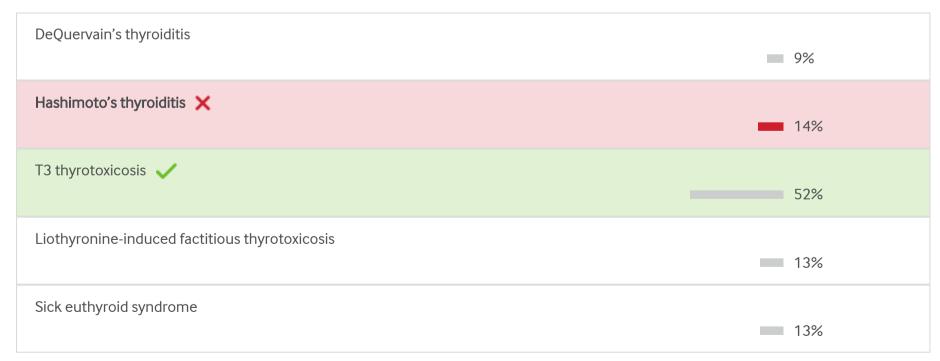
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Investigations showed:

Serum sodium	139 mmol/L	(137-144)
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Plasma TSH	<0.2 mU/L	(0.4-5.0)
Plasma thyroid binding globulin	22 mg/L	(13-28)

Radioactive iodine uptake was found to be increased.

What is the most likely diagnosis?



Key learning points 🛭



Endocrinology

• T3 toxicosis should be considered in patients with symptoms but normal T4 and suppressed TSH levels

Explanation

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The patient has symptoms and signs of thyrotoxicosis and a suppressed thyroid-stimulating hormone (TSH), but with low thyroid-stimulating hormone (T4) and fT4.

The main differentials are between triiodothyronine (T3) thyrotoxicosis and factitious thyrotoxicosis (purposeful or inadvertent ingestion of large quantities of thyroid hormone).

In factitious thyrotoxicosis, the proportions of T3 and T4 depend on the preparation of the thyroid hormone replacement tablets. Both T3 and T4 concentrations will be increased if the preparation contains both hormones; serum T3 is elevated and T4 depressed in those taking T3; and T4 elevated and T3 suppressed in those taking T4. However, radioactive iodine uptake (RAIU) and plasma thyroid-binding globulin (TBG) will be depressed and a goitre will not be palpable.

The diagnosis of T3 toxicosis should be suspected in patients presenting with symptoms of thyrotoxicosis (including a goitre) in whom serum T4 and fT4 are normal or low and in whom the RAIU is increased.

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Question 76 of 121

A 52-year-old woman with a known history of hypothyroidism comes to the clinic for review.

She has been maintained on 100 mcg of thyroxine daily for a number of years but has felt increasingly tired over the past few months. You understand she was an inpatient recently with an inferior myocardial infarction.

On examination her BP is 138/86 mmHg, pulse is 62 and regular and her weight is 85 kg, up from 80 kg at her last clinic appointment.

Her TSH has escaped the normal range and is measured at 7.0 IU/L (0.45-4.5).

Which of the following medications is most likely to have been responsible for this presentation?

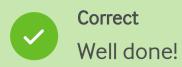
\circ	Aspirin	
\circ	Atorvastatin	
\circ	Ramipril	
\circ	Clopidogrel	
\circ	Omeprazole	
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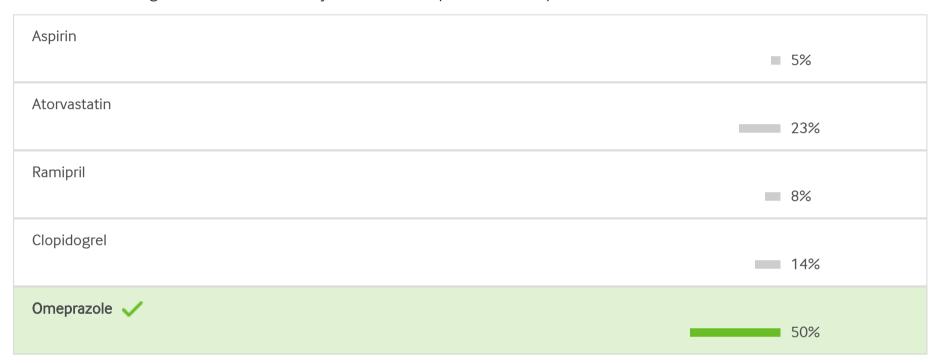
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Which of the following medications is most likely to have been responsible for this presentation?



Key learning points 🛭

Endocrinology

• A number of agents are known to interfere with thyroxine absorption, such as omeprazole.

Explanation

A number of agents are known to interfere with thyroxine absorption. These include binding agents such as cholestyramine and sevelamer, iron sulphate, and proton pump inhibitors.

It is likely that omeprazole has prevented adequate absorption of thyroxine (T4) and pushed her into clinical hypothyroidism.

High dose aspirin may affect interpretation of free T4 values, but low dose aspirin and clopidogrel are not known to interfere with thyroid function testing.

Neither atorvastatin nor ramipril are recognised to affect thyroid function.

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Question 77 of 121

A 35-year-old woman presented at 16 week gestation with history of a severe headache affecting the left side of her forehead, associated with visual symptoms of blurred vision in her left eye five days ago, whilst on a holiday in Spain. The headache and visual symptoms completely resolved over the next 12 hours with paracetamol.

On returning home, she reported the incident to her GP, who was concerned as she had been diagnosed with microprolactinoma five years ago and was treated with cabergoline in the past, which she took for about three years. Cabergoline was successfully stopped two years ago and her prolactin levels were maintained within the normal range.

This was the first time she had conceived and she had no other significant past medical history apart from migraine, from which she has been suffering for the last 15 years.

On examination, pulse was 78 beats per minute, blood pressure was 118/66 mmHg. There was no galactorrhoea to expression. Her visual acuity and papillary reflexes were normal. Fields of vision were normal to confrontation. Fundus examination was normal and there were no signs of meningeal irritation. The rest of systemic examination was normal as well.

3980 mU/L (<360)

Investigations showed:

Plasma prolactin

1 10511	а ргоношт	3700 III07 E	(300)	
Plasm	na free T4	22.3 pmol/L	(10-22)	
Plasm	na free T3	4.2 pmol/L	(5-10)	
Plasm	na thyroid-stimulating hormone	0.22 mU/L	(0.4-5)	
What is	the next most appropriate mana	gement?		
\circ	O Complete pituitary hormonal profile			
\circ	MRI scan of pituitary			
\circ	Repeat prolactin level			
0	CT scan of pituitary			
\circ	Reassurance			
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Investigations showed:

Plasma prolactin	3980 mU/L	(<360)
Plasma free T4	22.3 pmol/L	(10-22)
Plasma free T3	4.2 pmol/L	(5-10)
Plasma thyroid-stimulating hormone	0.22 mU/L	(0.4-5)

What is the next most appropriate management?

Complete pituitary hormonal profile	
	10%
MRI scan of pituitary	
	46%
Repeat prolactin level	
	4 %
CT scan of pituitary 🗶	
	■ 2%
Reassurance	
	39%

Key learning points 🛭

Endocrinology

• Prolactin levels are of no clinical use during prenancy as they will always be elevated

Explanation

This woman has hyperprolactinaemia that is typical of pregnancy, and no specific abnormalities to find on examination.

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Microprolactinomas rarely expand during pregnancy (less than 1%) and the prolactin concentration is no guide to this and does not need to be measured.

Headaches are common in pregnancy.

Features that would give rise to suspicion of expansion would include field constriction and atypical headache symptoms. Severe frontal headache may suggest apoplexy for instance.

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BMJ On Exam

English French

Question 78 of 121

A 28-year-old woman presents with amenorrhoea.

Her blood tests are as follows:

Prolactin 320 IU/L (<230)

Oestrogen 900 pmol/L (100-400 follicular phase)

LH <1 IU/L -

FSH 2 IU/L

What is the most likely diagnosis?

- Anorexia nervosa
- Pregnancy
- Microprolactinoma
- Treatment with metoclopramide
- O Polycystic ovaries

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A 28-year-old woman presents with amenorrhoea.

Her blood tests are as follows:

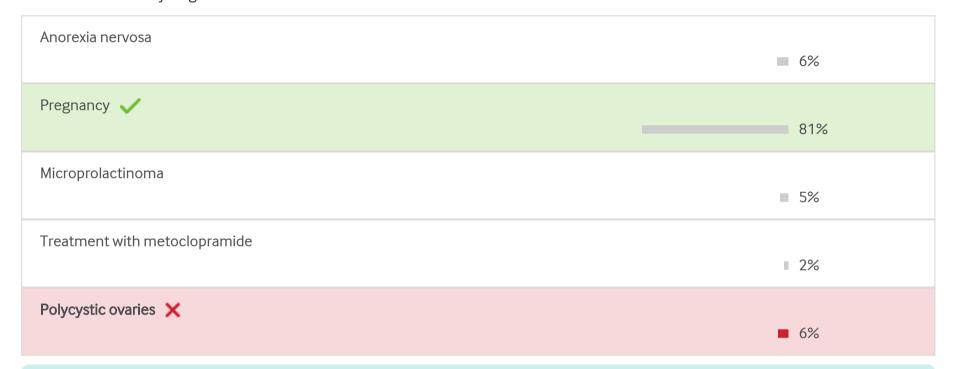
 Prolactin
 320 IU/L
 (<230)</td>

 Oestrogen
 900 pmol/L
 (100-400 follicular phase)

 LH
 <1 IU/L</td>

 FSH
 2 IU/L

What is the most likely diagnosis?



Endocrinology

• pregnancy blood result show high oestrogen, low luteinising hormone (LH) and follicle-stimulating hormone (FSH) and elevated prolactin and beta-HCG.

Explanation

This patient has typical blood results of pregnancy with high oestrogen, low luteinising hormone (LH) and follicle-stimulating hormone (FSH) (no more follicles are needed at present) and elevated prolactin.

Progesterone and beta-human chorionic gonadotropin (HCG) would also be elevated.

Causes of an elevated prolactin include:

- Pregnancy
- Lactation
- Macroadenoma (stalk compression)
- Microadenoma
- Nipple stimulation
- Breast trauma
- Post seizures

• Drug treatment: metoclopramide, antipsychotics, anticonvulsants, antidepressants and dopamine antagonists.

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☆ High impact question

A 22-year-old woman presented with a five year history of hirsutism, having noticed coarse dark hair under her chin. Being a teacher in a primary school, these symptoms are very distressing for her. She has tried local measures such as shaving and applying depilatory creams but without lasting success.

Her periods are irregular with oligomenorrhoea. She attained menarche at the age of 14 years. She has not yet conceived and has had a coil fitted for contraception. She takes 5 mg diazepam at night.

On examination, she had a BMI of 24. She had coarse, dark hair over her chin, lower back and inner thighs. She does not have galactorrhoea to expression and there were no other clinical features to suggest Cushing's.

Investigations during the follicular phase:

Serum androstenedione	10.1 nmol/L	(0.6-8.8)
Serum dehydroepiandrosterone sulphate	11.6 μmol/L	(2-10)
Serum 17-hydroxyprogesterone	18.6 nmol/L	(1-10)
Serum oestradiol	380 pmol/L	(200-400)
Serum testosterone	2.6 nmol/L	(0.5-3)
Plasma luteinising hormone	3.3 U/L	(2.5-10)
Plasma follicle-stimulating hormone	3.6 U/L	(2.5-10)

What is the next most appropriate investigation?

- O CT scan of adrenals
- O Short Synacthen test with measurement of 17 hydroxy progesterone (170HP)
- O Ultrasound scan of ovaries
- GnRH test
- 24 hour urinary free cortisol

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★ High impact question

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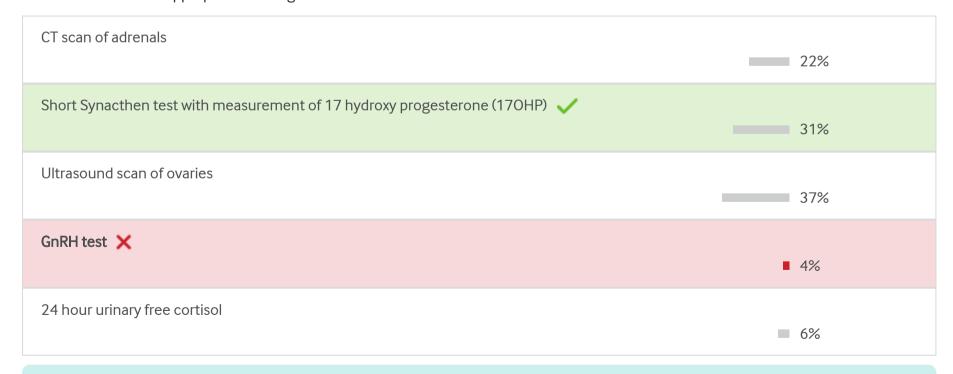
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Investigations during the follicular phase:

Serum androstenedione	10.1 nmol/L	(0.6-8.8)
Serum dehydroepiandrosterone sulphate	11.6 μmol/L	(2-10)
Serum 17-hydroxyprogesterone	18.6 nmol/L	(1-10)
Serum oestradiol	380 pmol/L	(200-400)
Serum testosterone	2.6 nmol/L	(0.5-3)
Plasma luteinising hormone	3.3 U/L	(2.5-10)
Plasma follicle-stimulating hormone	3.6 U/L	(2.5-10)

What is the next most appropriate investigation?



Endocrinology

• The synacthen stimulation test can evaluate adrenal gland function, and when 17-OHP levels are measured concurrently, can help to distinguish between PCOS and non-classical CAH.

Explanation

In this case the patient has features that would suggest <u>polycystic ovary syndrome</u> (PCOS) yet the 170HP concentration is elevated and is compatible with non-classical congenital adrenal hyperplasia (CAH).

Congenital adrenal hyperplastia is caused by an inherited defect in the cortisol and/or aldosterone biosynthetic pathways. Non-classical forms result from milder enzyme dysfunction and therefore manifest later in life (adolescence or adulthood). The most common form is due to 21-hydroxylase deficiency, but it can also result from 11 beta hydroxylase deficiency. The clinical presentation may be indistinguisable from polycystic ovarian syndrome, with hirtusism being a dominant feature.

The synacthen stimulation test can evaluate adrenal gland function, and when 17-OHP levels are measured concurrently, can help to distinguish between PCOS and non-classical CAH. N-CAH due to 21-hydroxylase deficiency is diagnosed with the ACTH-stimulated 17-OHP levles are more than 30 nmol/L (although this value varies with the assay used). If this is diagnosed, antiandrogens can be used to treat hirsutism, but glucocorticoids are generally not required.

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BMJ On Exam

English French

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A 19-year-old female student comes to the endocrinology clinic complaining of excessive hirsutism. She also suffers from acne for which she was given a three month course of doxycycline by a previous GP.

Her periods are irregular and tend to be heavy. Over the past six months modest weight loss has been achieved but she finds it difficult to lose further weight.

On examination her BP is 132/72 mmHg, her pulse is 67 and regular and her BMI is 27. She has excessive hair growth over her beard and moustache line, over her upper chest, and lower abdomen. Acne spreads over her face and neck.

Investigations show:

Haemoglobin	137 g/L	(115-160)
White cell count	6.3 ×10 ⁹ /L	(4-11)
Platelets	232 ×10 ⁹ /L	(150-400)
Sodium	137 mmol/L	(135-146)
Potassium	4.1 mmol/L	(3.5-5)
Creatinine	90 μmol/L	(79-118)
Testosterone	4 nmol/L	(1-2.5)
LH	100 U/L	(20-80)

Which of the following is the most appropriate treatment for her hirsutism?

PioglitazoneMetforminClomiphene

Dianette

 \bigcirc

Spironolactone

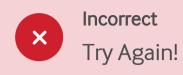
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English French



A 19-year-old female student comes to the endocrinology clinic complaining of excessive hirsutism. She also suffers from acne for which she was given a three month course of doxycycline by a previous GP.

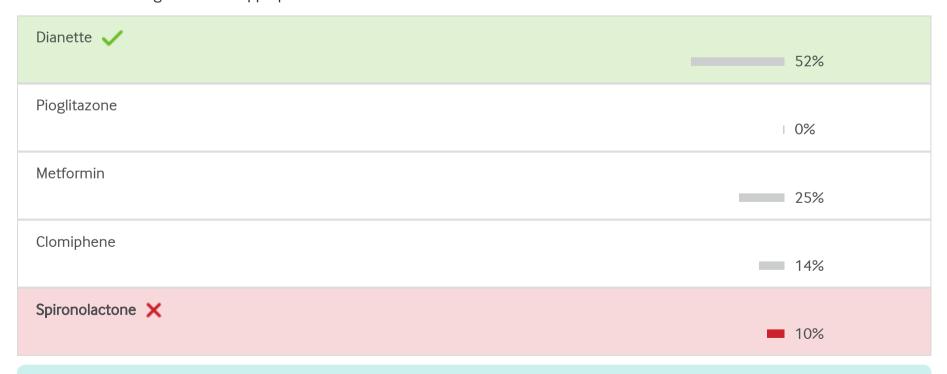
Her periods are irregular and tend to be heavy. Over the past six months modest weight loss has been achieved but she finds it difficult to lose further weight.

On examination her BP is 132/72 mmHg, her pulse is 67 and regular and her BMI is 27. She has excessive hair growth over her beard and moustache line, over her upper chest, and lower abdomen. Acne spreads over her face and neck.

Investigations show:

Haemoglobin	137 g/L	(115-160)
White cell count	6.3 ×10 ⁹ /L	(4-11)
Platelets	232 ×10 ⁹ /L	(150-400)
Sodium	137 mmol/L	(135-146)
Potassium	4.1 mmol/L	(3.5-5)
Creatinine	90 μmol/L	(79-118)
Testosterone	4 nmol/L	(1-2.5)
LH	100 U/L	(20-80)

Which of the following is the most appropriate treatment for her hirsutism?



Key learning points 🛭

Endocrinology

• Dianette, a combination of cyproterone acetate and ethinyloestradiol is considered an effective option for reducing hirsutism in patients with PCOS

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Explanation

Given this woman's history and biochemistry with an elevated testosterone and luteinising hormone (LH), the most likely diagnosis is polycystic ovarian syndrome (PCOS).

Dianette, a combination of cyproterone acetate and ethinyloestradiol is considered an effective option for reducing hirsutism in patients with PCOS. If hirsutism alone is the major problem, then local treatment with electrolysis can be considered.

Metformin acts by reducing insulin resistance and has positive effects on regularising the menstrual cycle. That alone may be enough to restore fertility, but if not, in women who wish to become pregnant, clomiphene citrate which increases follicle-stimulating hormone (FSH) may be considered.

Pioglitazone was previously used to treat PCOS associated insulin resistance, but is rarely considered an option now due to glitazone related adverse events.

Spironolactone is a weak antiandrogen which may be considered in some cases of PCOS.

Next question

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English French

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A 55-year-old male consulted his general practitioner with a three month history of lethargy and weight loss. Six years previously he was diagnosed with diabetes mellitus and was receiving gliclazide 160mg daily and metformin 1 g twice daily.

On examination he was noted to have a BMI of 25.6 kg/m 2 , a pulse of 88 beats per minute and a blood pressure of 164/102 mmHg. Fundal examination revealed numerous dot haemorrhages in the temporal retina of both eyes with occasional hard exudates. Loss of position and vibration sensation were also noted to the mid tibia bilaterally.

Investigations revealed:

Haemoglobin	140 g/L	(130-180)
White cell count	4.8 ×10 ⁹ /L	(4-11)
Platelets	195 ×10 ⁹ /L	(150-400)
Serum sodium	137 mmol/L	(137-144)
Serum potassium	4.6 mmol/L	(3.5-4.9)
Serum urea	16.7 mmol/L	(2.5-7.5)
Serum creatinine	220 μmol/L	(60-110)
HbA _{1c}	78 mmol/mol	(20-46)
	9.3%	(3.8-6.4)
Urinalysis	Protein++	
	Blood +	

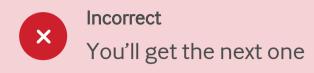
Which of the following is the most appropriate therapeutic strategy for this patient?

- O Stop metformin and gliclazide and start insulin
- Add liraglutide
- Pioglitazone
- Stop metformin
- O Change gliclazide to insulin

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



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HbA _{1c}	78 mmol/mol	(20-46)
	9.3%	(3.8-6.4)
Urinalysis	Protein++	
	Blood +	

Which of the following is the most appropriate therapeutic strategy for this patient?



Diabetes, Endocrinology

• Weight loss and osmotic symptoms suggest insulinopenia and therefore insulin should be commenced if glycaemic control is suboptimal.

Explanation

In this patient's case with the weight loss, modest BMI and poor glycaemic control with established retinopathy and nephropathy he should be switched to insulin.

Most authorities recommended that metformin should be stopped in patients with a creatinine above 150 µmol/L although this is not universal policy and many patients continue on metformin with creatinines much higher than 150 without any ill effect.

Although pioglitazone could be added to either metformin or gliclazide, there would be little benefit gained in this manoeuvre as his problem now appears to be weight loss with osmotic symptoms suggesting insulinopenia.

Similarly there would be little benefit in maximising his oral hypoglycaemic agents which are already at reasonably near to the top dose.

Given there are symptoms of insulinopaenia, a GLP-1 agonist is unlikely to be effective here.

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Question 82 of 121

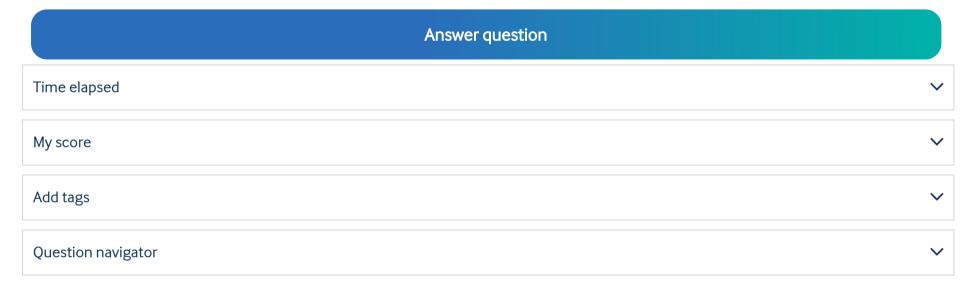
A 62 year-old woman is referred to you with persistent hypertension and obesity. She also complains of excessive pigmentation and headaches.

Her past medical history includes investigation in the 1970s for obesity, mild diabetes mellitus and hypertension. At that time she had a bilateral adrenal ectomy which was then the treatment of choice for her condition. Since then she has been on hydrocortisone and fludrocortisone treatment.

On examination, she is noted to have hyperpigmentation and striae. BP was 175/100 mmHg. No abnormality of the visual fields are noted.

Which of the following is the most appropriate investigation to confirm the diagnosis?

- 24-hour urinary catecholamines
- O Plasma adrenocorticotropic hormone level
- O Plasma aldosterone and renin activities in lying and standing positions before and after seven days of salt loading
- Short Synacthen test
- O Growth hormone response to oral glucose load



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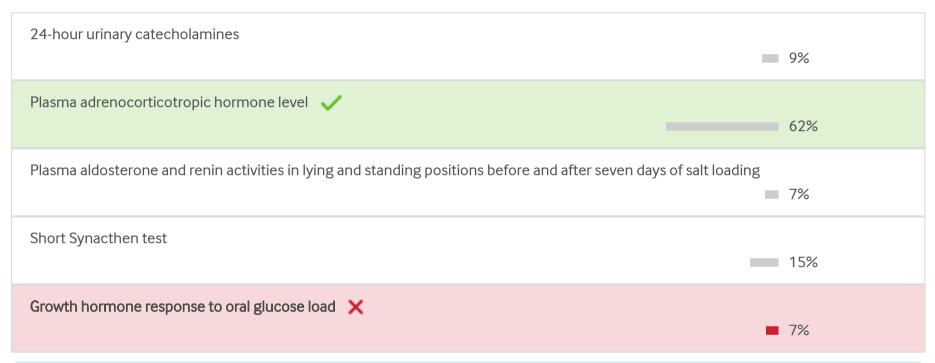


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Which of the following is the most appropriate investigation to confirm the diagnosis?



Key learning points



Endocrinology

• Nelson's syndrome effects 30% adrenalectomised patients with Cushing's disease

Explanation

Nelson's syndrome occurs in approximately 30% of patients adrenalectomised for Cushing's disease.

It is probably due to the clinical progression of the pre-existing pituitary adenoma after the restraint of hypercortisolism on adrenocorticotropic hormone (ACTH) secretion is removed.

Plasma ACTH levels are markedly elevated.

Pituitary magnetic resonance imaging (MRI) defines the extent of the tumour.

Next question

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Question 83 of 121

★ High impact question

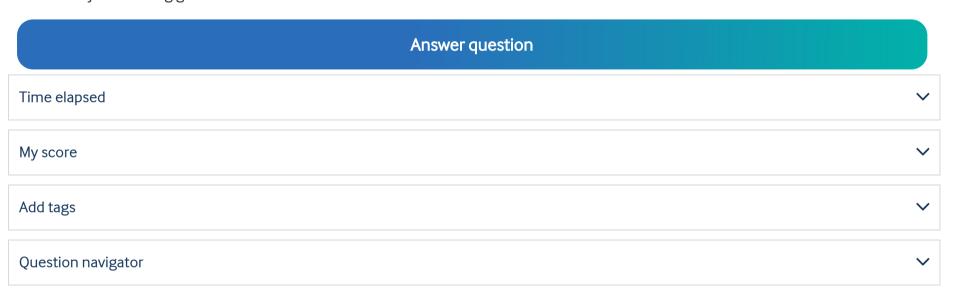
A 71-year-old woman who is taking long term amiodarone therapy for paroxysmal AF comes to the clinic for review. She has been complaining of increasing palpitations, weight loss and heat intolerance over the past few months.

On examination her BP is 149/89 mmHg, pulse is 85 and regular. She is sweaty and has a tremor.

A TSH is measured at 0.1 IU/L.

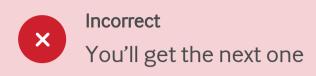
Which of the following is most likely to differentiate between Amiodarone induced thyrotoxicosis (AIT) type 1 and type 2?

- O Interleukin 6
- Colour flow Doppler of the thyroid
- O Free T3
- O Interleukin 1
- O Thyroid binding globulin



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English French



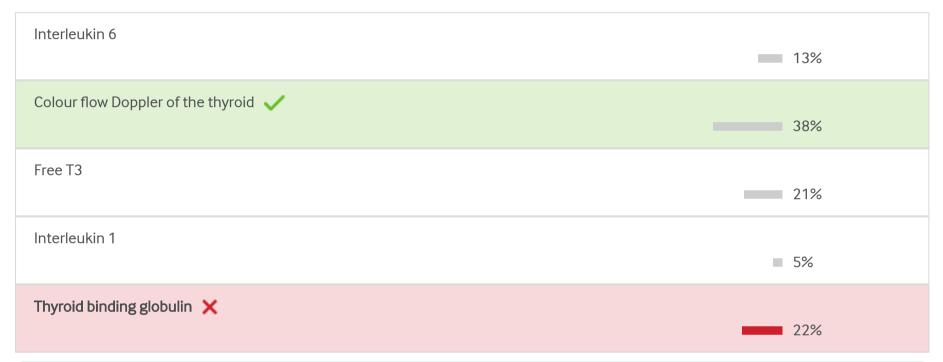
★ High impact question

A 71-year-old woman who is taking long term amiodarone therapy for paroxysmal AF comes to the clinic for review. She has been complaining of increasing palpitations, weight loss and heat intolerance over the past few months.

On examination her BP is 149/89 mmHg, pulse is 85 and regular. She is sweaty and has a tremor.

A TSH is measured at 0.1 IU/L.

Which of the following is most likely to differentiate between Amiodarone induced thyrotoxicosis (AIT) type 1 and type 2?



Key learning points 💡

Endocrinology

• Colour flow Doppler has been investigated as a useful tool to differentiate type 1 and type 2 amiodarone induced thyroiditis.

Explanation

Type 2 AIT is an autoimmune thyroiditis. Colour flow Doppler has been investigated as a tool to differentiate type 1 and type 2 AIT in a number of studies including the one referenced below. It appears to be superior to IL-6.

Interleukin 6 levels may be markedly elevated in AIT type 2, although this is not invariable and IL-6 may also be raised by concurrent non-thyroidal illness.

IL-1, free T3 and TBG are not as useful with respect to differentiating between the two types of AIT. Differentiation between type 1 and type 2 is important as it drives therapy, particularly with regard to use of corticosteroids.

Reference:

Eaton SE, et al. <u>Clinical experience of amiodarone-induced thyrotoxicosis over a 3-year period: role of colour-flow Doppler sonography.</u> <u>Clin Endocrinol (Oxf).</u> 2002;56:33-8.

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A 52-year-old female presents with weight loss, anxiety and difficulty sleeping. She had been taking combined cyclical oestrogen/progesterone hormone replacement therapy over the last two years.

On examination she was noted to have a body mass index of 26.5 kg/m^2 , a pulse of 104 beats per minute and a blood pressure of 112/72 mmHg. No goitre was palpable and eye movements were entirely normal. She was noted to have weakness of the proximal musculature of the shoulder and hip girdles.

Initial investigations revealed:

Serum total thyroxine 250 nmol/L (60-140)

Plasma TSH <0.1 mu/L (0.4-5.0)

Serum alkaline phosphatase 202 U/L (45-105)

Serum gamma glutamyl transferase 30 U/L (4-35)

Her general practitioner commenced her on carbimazole 10 mg tds together with propranolol 120 mg bd. At review six weeks later the patient appeared clinically euthyroid.

Repeat investigations showed:

Total thyroxine 180 nmol/L
Plasma TSH 2.2 mU/L
Serum alkaline phosphatase 160 U/L
Serum gamma glutamyl transferase 36 U/L

The dose of carbimazole was decreased to 20 mg daily. After one year the GP decided to refer her to endocrine outpatients. Two weeks before she had a chest infection treated with erythromycin.

Her blood test results showed:

Serum total thyroxine 80 nmol/L
Plasma TSH 12.8 mU/L
Serum alkaline phosphatase 102 U/L
Serum gamma glutamyl transferase 42 U/L

What is the cause of her thyroid function test results at her medical outpatient visit?

- O Recent chest infection
- O Interaction between erythromycin and carbimazole
- O Patient stopped HRT
- Over-treatment with carbimazole
- O Interaction between HRT and carbimazole

Answer question

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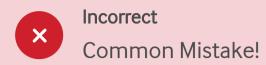
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BMJ On Exam

English French



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What is the cause of her thyroid function test results at her medical outpatient visit?



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Endocrinology

• Erythromycine may potentiate the effect of carbimazole due to it's inhibition of liver enzyme activity

Explanation

This patient was hyperthyroid and was treated with carbimazole that has now made her hypothyroid as reflected by the high thyroid-stimulating hormone.

Although her total thyroid hormone concentration is normal it is likely that her free thyroxine (T4) would be low. Although this might be due to increased thyroid binding globulin associated with hormone replacement therapy, it is more likely that the effect of carbimazole has been potentiated by the liver enzyme-inhibiting effect of erythromycin that was prescribed for her upper respiratory tract infection.

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English French

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☆ High impact question

A 21-year-old female with a four year history of type 1 diabetes is admitted with dysuria, fever and rigors.

She has been using mixed insulin twice daily and her last HbA_{1c} was 55 mmol/mol (7.2%) at annual review three months ago.

On examination, she has a temperature of 39°C, a blood pressure of 112/76 mmHg and a pulse of 110 bpm. Cardiovascular and respiratory examination are unremarkable. She has diffuse tenderness on abdominal examination.

Results on admission show:

 Plasma Glucose
 32 mmol/L
 (3.5-6)

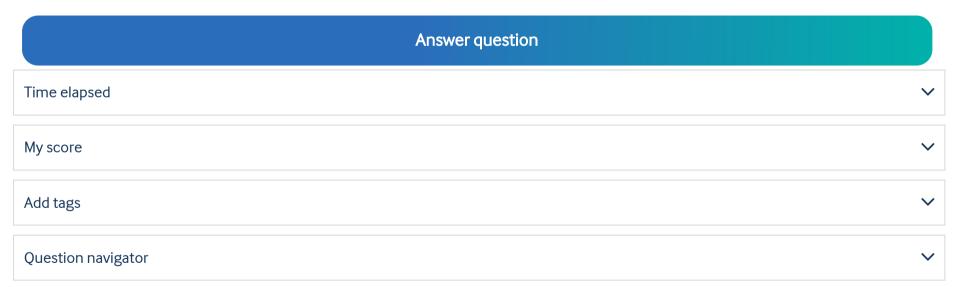
 pH
 7.1
 (7.35-7.45)

 Standard bicarbonate
 9 mmol/L
 (22-28)

The patient is commenced on a fixed rate of insulin infusion IV.

Which of the following is the most appropriate management strategy of her pH status?

- O IV Bicarbonate infusion should be administered in HDU
- O IV Bicarbonate should be administered and the patient transferred to a medical ward
- Oral bicarbonate should be adminsitered
- O There is no requirement to administer IV bicarbonate
- O IV Bicarbonate should be given as an infusion



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English French



★ High impact question

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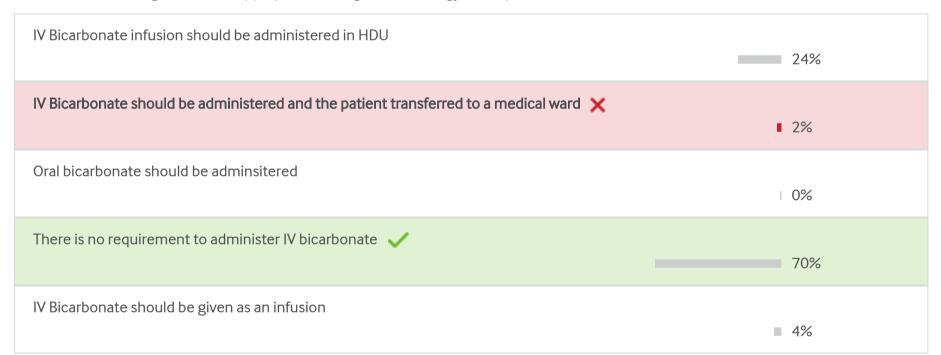
Plasma Glucose 32 mmol/L (3.5-6)

pH 7.1 (7.35-7.45)

Standard bicarbonate 9 mmol/L (22-28)

The patient is commenced on a fixed rate of insulin infusion IV.

Which of the following is the most appropriate management strategy of her pH status?



Key learning points $\, \, \mathbb{Q} \,$

Diabetes, Endocrinology

• JBDS DKA guideline - no evidence for IV bicrabonate with pH >7

Explanation

The patient has a diagnosis of diabetic ketoacidosis (DKA).

Ketones fall quickly indicating a response to treatment in DKA.

Bicarbonate responds slowly to an insulin infusion.

There is no evidence to support bicarbonate use in a patient with a pH greater than 7.0.

Guidance from the Joint British Diabetes Societies Inpatient Care Group on <u>The Management of Diabetic Ketoacidosis</u> in <u>Adults</u> replaces the use of a sliding scale with a fixed rate intravenous insulin infusion (IVII):

- 0.1 unit/kg/hr based on estimate of weight
- 50 units human soluble insulin (Actrapid or Humulin S) made up to 50 ml with 0.9% sodium chloride solution
- If patient normally takes long acting insulin analogue (Lantus, Levemir) continue at usual dose and time.

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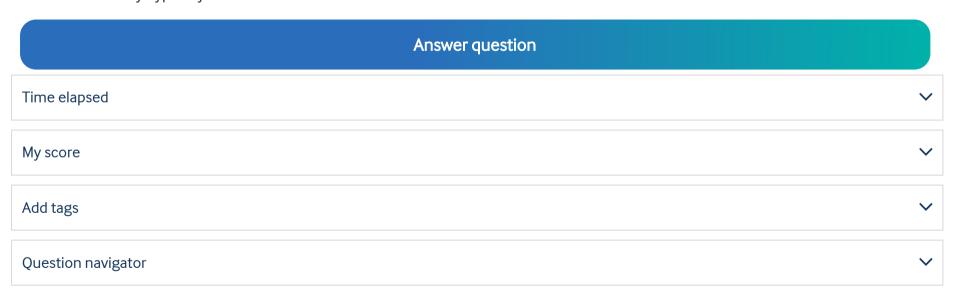
A 15-year-old girl is referred by her general practitioner with agitation and weight gain.

Her mother accompanies her during the consultation and explains that over the last two months she has become increasingly agitated with poor sleep. Her progress at school has up until recently, been fine, although of late she has been apathetic. She has no past medical history of note.

Examination reveals no specific abnormalities with a blood pressure of 112/70 mmHg and a BMI of 20. Her GP's letter reveals the following results:

TSH 3.2 mU/L (0.4-5.0)Total T₄ 250 nmol/L (55-144) Free T₄ 12.9 pmol/L (10-22) Total T_3 3.2 nmol/L (0.9-2.8)3.8 pmol/L (5-10)Free T₃ What is the likely diagnosis?

- \bigcirc Laboratory error
- \bigcirc Anorexia nervosa
- \bigcirc Apathetic thyrotoxicosis
- \bigcirc Pregnancy
- Secondary hyperthyroidism



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English French



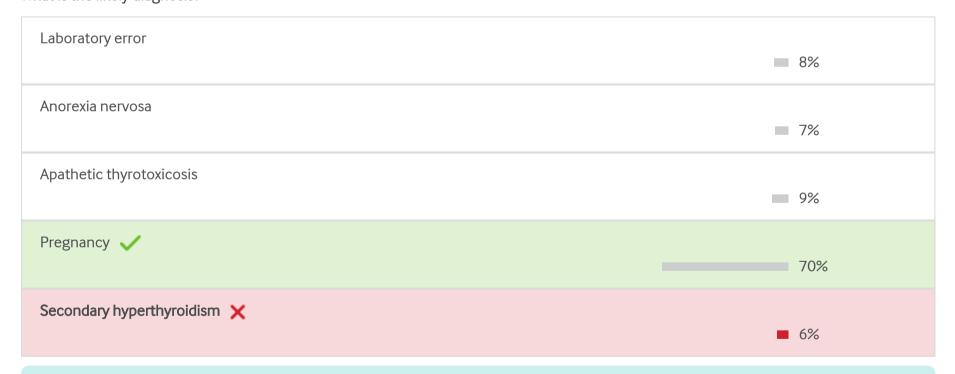
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What is the likely diagnosis?



Endocrinology

• Pregnancy increases thyroid binding globulin

Explanation

This patient has a good story of something going awry in the last two months and with normal thyroid function except for the elevated total T4 and T3 concentrations reflecting increased hormone binding.

The suggested diagnosis is pregnancy.

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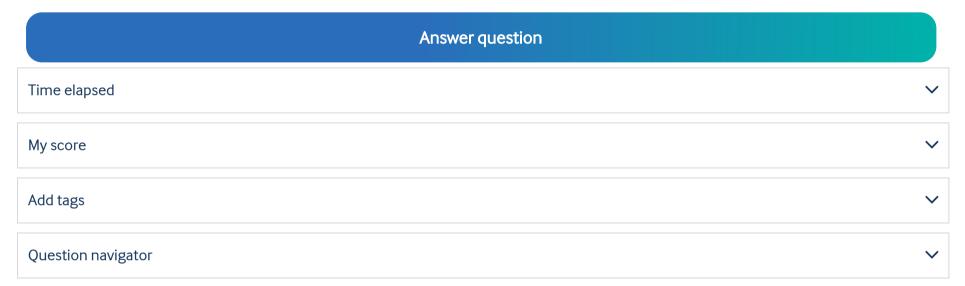
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A 17-year-old male comes to the clinic for review. His 14-year-old brother has been recently diagnosed with type 1 diabetes. He wants to know about his risk of developing the disorder.

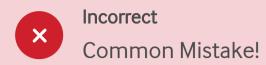
Which of the following features is most closely associated with the imminent development of type 1 diabetes?

- O Anti-insulin antibodies
- O Anti-IA2 antibodies
- O Loss of first phase insulin response
- O Loss of second phase insulin response
- Anti-ZnT8 antibodies



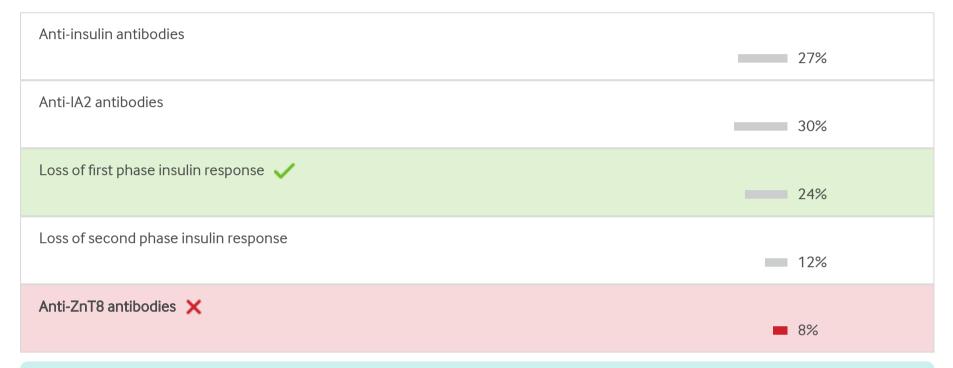
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A 17-year-old male comes to the clinic for review. His 14-year-old brother has been recently diagnosed with type 1 diabetes. He wants to know about his risk of developing the disorder.

Which of the following features is most closely associated with the imminent development of type 1 diabetes?



Key learning points 🛭

Endocrinology

• Loss of first phase insulin response is closely associated with the development of diabetes, with 100% of subjects with loss of first phase insulin response and anti-IA2 antibodies progressing to type 1 diabetes within 2 years.

Explanation

Loss of first phase insulin response is closely associated with the development of diabetes, with 100% of subjects with loss of first phase insulin response and anti-IA2 antibodies progressing to type 1 diabetes within 2 years. When weighing up which of the possible answers has the greatest contribution to the risk of diabetes development, it's important to remember that individuals may remain antibody positive for many years before developing T1DM, but the loss of first phase insulin response is an indicator of significant impending beta cell destruction.

The presence of autoantibodies such as IA2 and ZnT8 is associated with around a 50% risk of development of diabetes over a five year period. This is less than the risk of development of diabetes with loss of first phase insulin response, which is nearer to 100% over two years.

Loss of second phase insulin response is associated with a risk of diabetes intermediate between autoantibodies alone, and loss of first phase insulin response.

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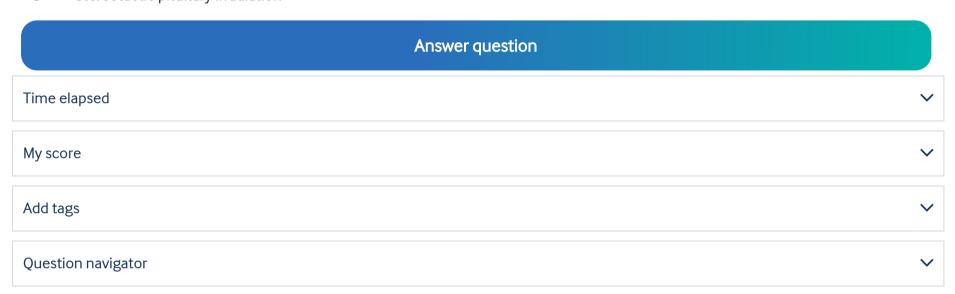
A 33-year-old female presents with a one year history of galactorrhoea and amenorrhoea. She informs you that she does not want to become pregnant.

On examination there is galactorrhoea to expression and visual fields are normal to confrontation.

Investigations confirm the diagnosis of a macroprolactinoma, with a prolactin concentration of 10,500 mU/L (50-500) and MRI of the pituitary revealing a 1.5 cm tumour with some suprasellar extension.

What is the most appropriate treatment for this woman?

- Cabergoline therapy
- Pituitary surgery
- O Somatostatin analogue therapy
- Combined oral contraceptive
- Stereotactic pituitary irradiation



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English French

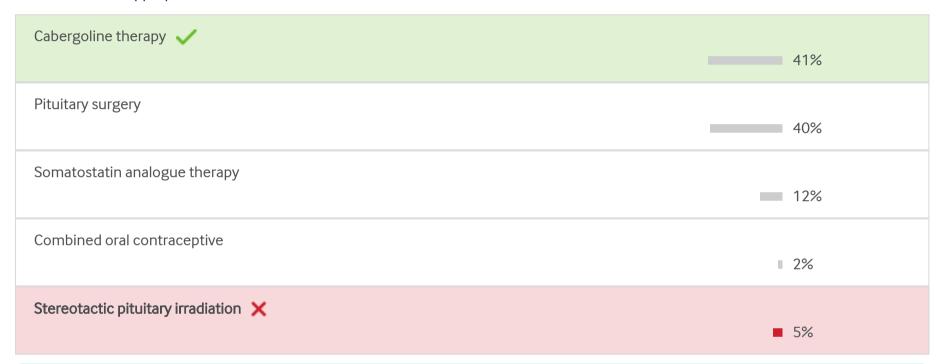


A 33-year-old female presents with a one year history of galactorrhoea and amenorrhoea. She informs you that she does not want to become pregnant.

On examination there is galactorrhoea to expression and visual fields are normal to confrontation.

Investigations confirm the diagnosis of a macroprolactinoma, with a prolactin concentration of 10,500 mU/L (50-500) and MRI of the pituitary revealing a 1.5 cm tumour with some suprasellar extension.

What is the most appropriate treatment for this woman?





Endocrinology

Dopamine agonists are the treatment of choice in patients with micro/macroprolactinoma

Explanation

This young woman has a macroprolactinoma and these are exquisitely sensitive to dopamine agonist therapy and rapid tumour reduction with restoration of menses and cessation of galactorrhoea expected. If she were asymptomatic, there is no absolute requirement for treatment. Indications for treatment are adverse effect of tumour size or effects of prolactinaemia.

The dopamine agonists, cabergoline and bromocriptine, reduce prolactin levels thereby allowing oestrogen levels to normalise. They are effective in most patients, but do normally need to continued long-term. Contraindications to treatment are cardiac valve fibrosis and pulmonary fibrosis.

Pituitary surgery is rarely required in prolactinomas and is generally reserved for patients intolerant of or resistant to dopamine agonist therapy. Radiotherapy can be used to reduce the chance of tumour recurrence, but is rarely required.

The fact that she does not want to become pregnant is a bit of an irrelevance. However, it is important to note that there is a small risk of tumour enlargement during pregnancy and the patient should be closely monitored by an Endocrinologist. If possible, dopamine agonists can be held during pregnancy but if treatment is required bromocriptine has the most safety data.

Combined oral contraceptives can lead to mild rises in serum prolactin, and therefore should only be used with caution in patients with prolactinomas.

Somatostatin analogues are used to treat carcinoid and other neuroendocrine tumours, but not prolactinomas.

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Question 89 of 121

A 30-year-old woman is referred to you for treatment of obesity.

Which of the following would be correct when considering treatment in this woman?

- O An anti-obesity drug should only be considered for those with a body mass index of 25 kg/m² or greater
- O Anti-obesity drug treatment should be discontinued if the individual regains weight at any time whilst receiving drug treatment
- O Combination anti-obesity drug therapy may be used in resistant cases
- Orlistat can be used as the sole element of treatment
- O Diet and exercise are generally the best methods of treatment over the long term

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A 30-year-old woman is referred to you for treatment of obesity.

Which of the following would be correct when considering treatment in this woman?

An anti-obesity drug should only be considered for those with a body mass index of 25 kg/m 2 or greater **3%** Anti-obesity drug treatment should be discontinued if the individual regains weight at any time whilst receiving drug treatment 22% Combination anti-obesity drug therapy may be used in resistant cases **5%** Orlistat can be used as the sole element of treatment 4% Diet and exercise are generally the best methods of treatment over the long term X 66%



Endocrinology, Therapeutics

• Patients on anti-obesity drugs who gain weight should have the drug withdrawn.

Explanation

An anti-obesity drug should only be considered for those with a body mass index (BMI) of 30 kg/m² or greater in whom at least three months of managed care involving supervised diet, exercise and behaviour modification fails.

If risk factors (for example, diabetes mellitus, coronary heart disease, hypertension and obstructive sleep apnoea) are present, it may be appropriate to prescribe a drug to individuals with a BMI of 28 kg/m² or greater.

Anti-obesity drug treatment should also be discontinued if weight loss is less than 5% after the first 12 weeks.

Combination drug therapy is contraindicated at present and drugs should never be used as the sole element of treatment.

Diet and exercise have been shown to be ineffective over the long term.

More than 90% of people who attempt to lose weight gain it all back.

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Question 90 of 121

★ High impact question

A 55-year-old woman was coincidentally found to have hypercalcaemia.

She was asymptomatic with unremarkable examination findings.

Investigations revealed:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.1 mmol/L	(3.5-4.9)
Serum urea	3.8 mmol/L	(2.5-7.5)
Serum creatinine	88 μmol/L	(60-110)
Serum corrected calcium	2.76 mmol/L	(2.2-2.6)
Serum phosphate	0.86 mmol/L	(0.8-1.4)
Serum alkaline phosphatase	86 U/L	(45-105)
Plasma parathyroid hormone	5.3 pmol/L	(0.9-5.4)
24-h urinary calcium	0.5 mmol/24hr	(2.5-7.5)

What is the most likely diagnosis?

- O Vitamin D intoxication
- O Familial hypocalciuric hypercalcaemia
- Secondary hyperparathyroidism
- O Primary hyperparathyroidism
- O Tertiary hyperparathyroidism

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☆ High impact question

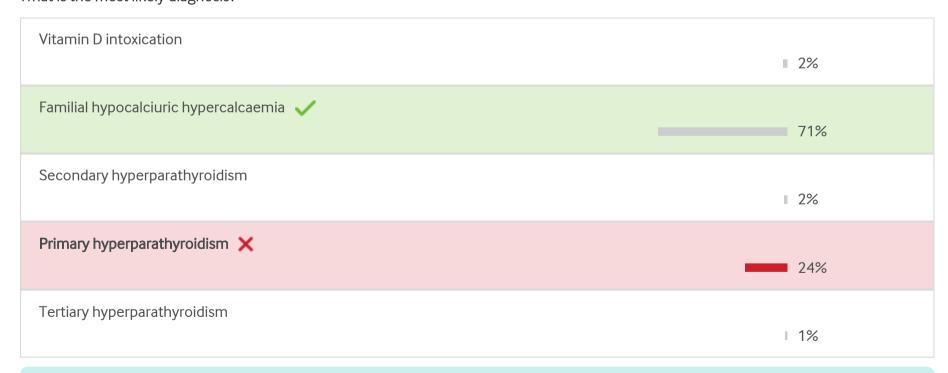
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24-h urinary calcium	0.5 mmol/24hr	(2.5-7.5)

What is the most likely diagnosis?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• FHH is associated with raise serum calcium, normal PTH and low urinary calcium.

Explanation

This asymptomatic patient has mild hypercalcaemia with normal phosphate and a slightly high calcium concentration.

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This suggests <u>primary hyperparathyroidism</u>, yet the urine calcium excretion is particularly low arguing against this diagnosis and in conjunction with the asymptomatology FHH is the likely cause. FHH is a benign cause of hypercalcemia that is characterized by autosomal dominant inheritance with high penetrance.

Affected heterozygous patients typically present in childhood with the incidental discovery of:

- mild hypercalcemia
- hypocalciuria
- a normal PTH level, and
- high-normal to frankly elevated serum magnesium levels.

(Urinary calcium in mg per 24 hours. The College of Physicians quote mmol/L. To convert the values for urinary calcium from mg to mmol/24 h, multiply by 0.02495).

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Question 91 of 121

☆ High impact question

A 23-year-old female presents acutely unwell. She has a three month history of weight loss, tiredness and lethargy which has deteriorated over the last week. Six weeks previously she had been diagnosed with hypothyroidism by her general practitioner.

Investigations at that time showed:

Free T4 8.8 pmol/L (10-22)

Plasma TSH 5.5 mU/L (0.4-5)

She had started thyroxine 50 µg daily but had deteriorated over the last two weeks.

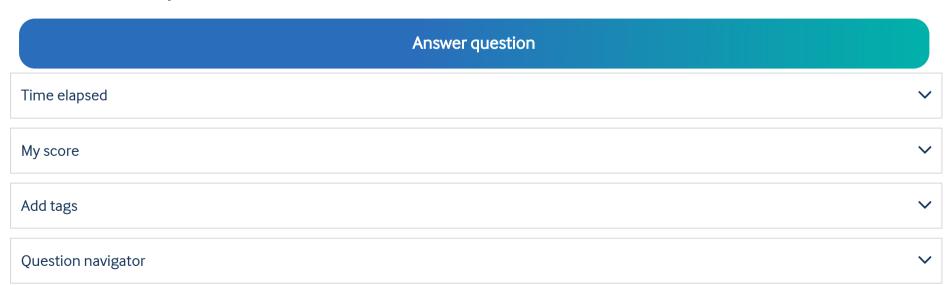
She is a non-smoker, drinks no alcohol and takes the oral contraceptive pill. Her mother and maternal grandmother have both been diagnosed with hypothyroidism and take thyroxine.

On examination she appears unwell and mildly dehydrated. She has a temperature of 37.5° C and has a BMI of 21.3 kg/m^2 . Her blood pressure is 72/44 mmHg, with a pulse of 100 beats per minute. Examination of the cardiovascular system is otherwise normal. No abnormalities are encountered on respiratory or abdominal examination. Brief neurological examination is normal and both plantars are flexor.

As yet, the investigations requested by the house officer are unavailable.

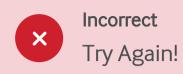
In the meantime what is the most appropriate immediate management of this patient?

- O Intravenous thyroxine (T4)
- O Intravenous fluids and hydrocortisone
- Intravenous glucose
- O Intravenous cefotaxime
- O Intravenous thyronine (T3)



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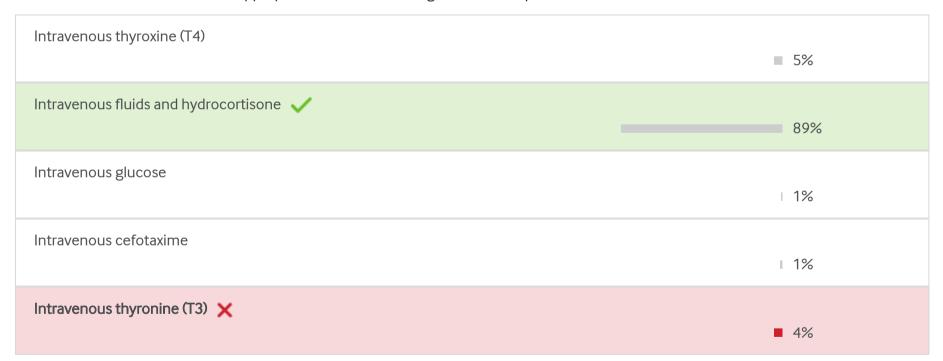
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As yet, the investigations requested by the house officer are unavailable.

In the meantime what is the most appropriate immediate management of this patient?



Key learning points 🛭

Emergency Medicine, Endocrinology

• Thyroxine may exacerbate/precipitate Addisonian crisis in undiagnosed patients

Explanation

The patient has had a long history of weight loss and fatigue and was diagnosed with hypothyroidism based upon a slightly low T4 and slightly high TSH. Thyroxine was prescribed but this has precipitated a deterioration of the underlying condition such that the patient presents with features suggesting an addisonian crisis.

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Thus is a medical emergency and should be treated with intravenous fluids and hydrocortisone. An appropriate test would be a short Synacthen test which could be completed in 30 minutes. Adrenal autoantibodies are likely to be positive in over 80% of cases.

Sick euthyroidism is a recognised feature of Addison's disease and treatment with thyroxine may exacerbate the condition and precipitate acute hypoadrenalism.

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Question 92 of 121

A 55-year-old man with acute abdominal pain and a distended abdomen is admitted to the ITU. He has received one litre of Hartmann's solution in the Emergency Department.

On examination his pulse is 120 bpm, blood pressure 70/40 mmHg, temperature is 39°C and oxygen saturation is 93% on high-flow oxygen. He is anuric.

Arterial blood gases show:

pH 7.22

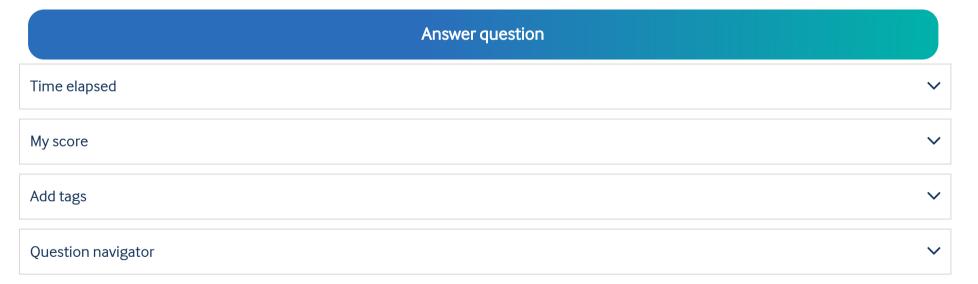
Base Excess -13.5 mmol/L

Lactate 6.5 mmol/L

K⁺ 5.9 mmol/L

What should be the priority in his immediate management?

- O Further fluid resuscitation
- Commence inotropic support
- O Arrange an abdominal CT scan
- O Commence haemodiafiltration
- O Institute cardiac output monitoring



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Arterial blood gases show:

pH 7.22

Base Excess -13.5 mmol/L

Lactate 6.5 mmol/L

 K^+ 5.9 mmol/L

What should be the priority in his immediate management?

Further fluid resuscitation 🗸	65%
Commence inotropic support	18%
Arrange an abdominal CT scan	■ 6%
Commence haemodiafiltration	8%
Institute cardiac output monitoring 🗶	■ 3%

Key learning points 🛭

Endocrinology, Metabolism

• The main priories in the management of sepsis should be high flow oxygen, fluid resuscitation, accurate urine output monitoring, empiric antibiotics, blood cultures and the measurement of serum lactate.

Explanation

The priority in his immediate management should be aggressive fluid resuscitation. The patient is likely to have septic shock secondary to intra-abdominal sepsis. Whilst there are acid base and electrolyte abnormalities that eventually might warrant renal support, the first step is to administer fluids whilst establishing appropriate haemodynamic monitoring with the insertion of invasive arterial and central venous pressure lines.

Cardiac output monitoring may also required to guide fluid and inotropic support. High flow oxygen therapy, blood cultures and empiric antibiotic are also priorities whilst staff in theatre are being mobilised. The patient will require an urgent exploratory laparotomy and not an abdominal CT scan as this could delay definitive care.

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The patient may eventually require renal support in the postoperative period if he fails to respond to these early measures.

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Question 93 of 121

A 29-year-old patient is seen in the outpatient clinic. She complains of feeling tired all the time, being unable to sleep at night and generally having a low mood with frequent tearful episodes.

Systemic enquiries reveal a poor appetite and long-standing constipation. Past medical history reveals that she had a recent gynaecology consultation for menorrhagia. Her current medication is paroxetine 20 mg prescribed by the GP for depression and 75 µg of thyroxine daily.

On examination the patient weighs 75 kg and has a BMI of 28 kg/m^2 . Her pulse rate is 60 beats/min, she has a blood pressure of 124/80 mmHg with audible first and second heart sounds. The chest is clear and abdominal examination is unremarkable. Neurological examination is normal. Examination of the thyroid gland reveals a small, smooth goitre, the eye movements are normal and there is no lid lag or chemosis.

Investigations reveal:

Haemoglobin	120 g/L	(115-165)
MCV	75 fL	(80-96)
White cell count	10 ×10 ⁹ /L	(4-11)
Platelets	205 ×10 ⁹ /L	(150-400)
Vitamin B12	350 pg/ml	(120-900)
Folate	10 ng/ml	(3-10)
Ferritin	15 mg/dL	(30-300)
Sodium	136 mmol/L	(137-144)
Potassium	4.5 mmol/L	(3.5-4.9)
Urea	7.0 mmol/L	(2.5-7.5)
Creatinine	75 μmol/L	(60-110)
TPO antibodies	Positive	
TSH	14 mU/L	(0.5-6.0)
Free T4	18 pmol/L	(9-25)
Free T3	5 pmol/L	(3.4-5.5)

Which of the following is the likely diagnosis?

- Hashitoxicosis
- O Non-compliance with thyroxine
- Pregnancy
- O TSH secreting pituitary tumour
- O Graves' disease with alternating TSH stimulating and inhibiting antibody

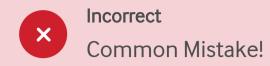
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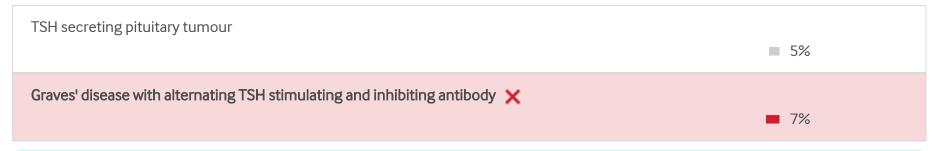
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Free T4	18 pmol/L	(9-25)
Free T3	5 pmol/L	(3.4-5.5)

Which of the following is the likely diagnosis?

Hashitoxicosis	18%
Non-compliance with thyroxine	63%
Pregnancy	■ 6%

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Endocrinology

• TSH is elevated with normal thyroid hormone levels in patients with poor compliance with medication

Explanation

This patient has historical and examination findings of hypothyroidism as evidence by lethargy, diminished appetite, weight gain, altered bowel habit, and menorrhagia. Biochemically, the low MCV and ferritin can be explained by menorrhagia.

She is also overweight, bradycardic with a small goitre. The thyroid function test (TFT) results support this with an elevated TSH due to chronic under-replacement of thyroxine (T4) or non-compliance; the patient has likely taken some thyroxine recently as the T4 is within normal limits (and T4 is converted to T3).

The clinical picture and biochemistry are inconsistent with Graves' disease. A thyrotrophinoma would be clinically thyrotoxic with an elevation of T4. Untreated Graves' disease usually presents with thyrotoxicosis and elevated T4 with low TSH. Hashitoxicosis is a transient hyperthyroid state due to inflammation of the thyroid and would also have elevated T4 with low TSH.

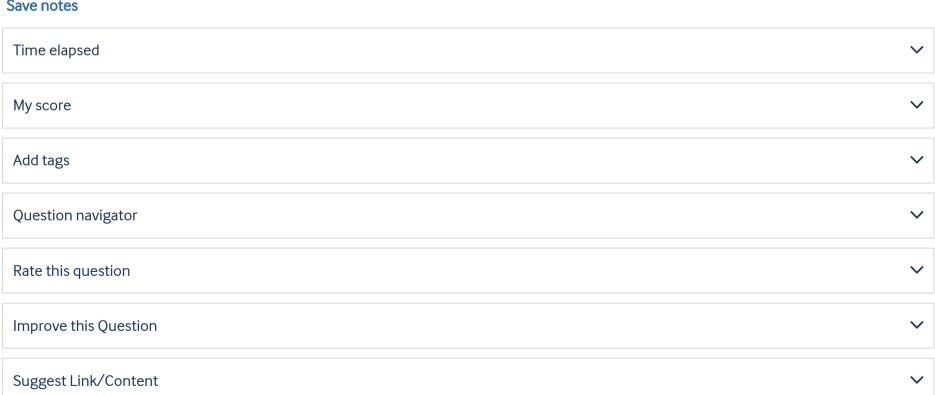
In the early stages of pregnancy the TSH is suppressed due do the effect of beta HCG.

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Question 94 of 121

★ High impact question

A 62-year-old woman was referred to the endocrinology clinic by her general practitioner with a lump in her neck.

There were no accompanying symptoms of hyperthyroidism or hypothyroidism.

On clinical examination she had a painless solitary thyroid nodule and she was clinically euthyroid. A fine needle biopsy demonstrated follicular carcinoma of the thyroid.

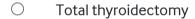
Which of the following treatments should she receive first?

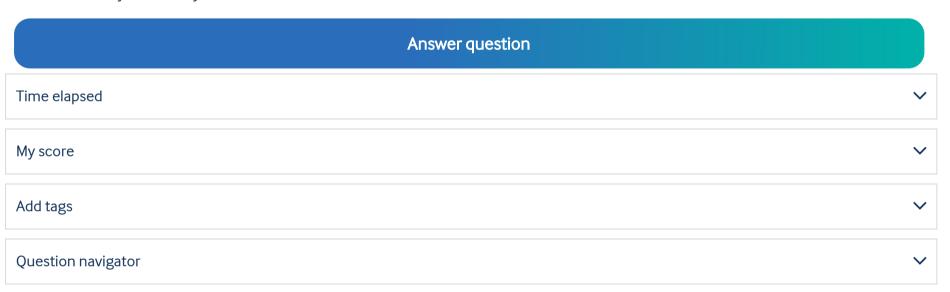
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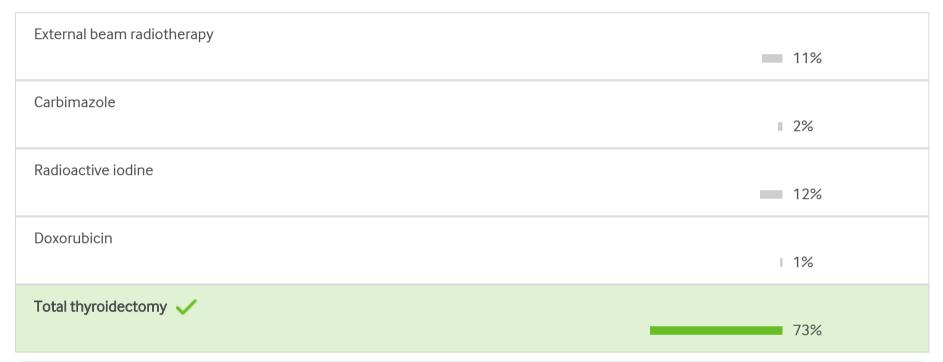
☆ High impact question

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On clinical examination she had a painless solitary thyroid nodule and she was clinically euthyroid. A fine needle biopsy demonstrated follicular carcinoma of the thyroid.

Which of the following treatments should she receive first?



Endocrinology

• Follicular thyroid cancer is treated surgically.

Explanation

There are four main types of thyroid cancer (in order of frequency):

- 1. Papillary
- 2. Follicular
- 3. Medullary
- 4. Anaplastic.

Follicular thyroid carcinoma (FTC) is a well-differentiated tumour. In fact, FTC resembles the normal microscopic pattern of the thyroid. FTC originates in follicular cells and is the second most common cancer of the thyroid after papillary carcinoma. The most common presentation of thyroid cancer is an asymptomatic thyroid mass, or a nodule, that can be felt in the neck.

The staging of well-differentiated thyroid cancers is related to age for the first and second stages but not related for the third and fourth stages.

Younger than 45 years:

- Stage I Any T, any N, M0 (Cancer is in the thyroid only).
- Stage II Any T, any N, M1 (Cancer has spread to distant organs).

Older than 45 years:

• Stage I - T1, N0, M0 (Cancer is in the thyroid only and may be found in one or both lobes).

- Stage II T2, N0, M0 and T3, N0, M0 (Cancer is in the thyroid only and is larger than 1.5 cm).
- Stage III T4, N0, M0 and any T, N1, M0 (Cancer has spread outside the thyroid but not outside of the neck).
- Stage IV Any T, any N, M1 (Cancer has spread to other parts of the body).

Surgery is the definitive management of thyroid cancer. Various types of operations may be performed.

Lobectomy with isthmectomy is the minimal operation for a potentially malignant thyroid nodule. Patients less than 40 years who have FTC nodules less than 1 cm, well defined, minimally invasive, and isolated may be treated with hemithyroidectomy and isthmectomy.

If feasible, subtotal thyroidectomy (small part of contralateral lobe retained) is preferable since it carries a lower incidence of complications (for example, hypoparathyroidism, superior and/or recurrent laryngeal nerve injury).

Approximately 10% of patients who have had total thyroidectomy (removal of all thyroid tissue preserving the contralateral parathyroid glands) demonstrate cancer in the contralateral lobe. Total thyroidectomy should be performed in patients who are more than 40 years with FTC and in any patient with bilateral disease. Total thyroidectomy is recommended for any patient with a thyroid nodule and a history of irradiation. Some studies show lower recurrence rates and increased survival rates in patients who have undergone total thyroidectomy. This surgical procedure also facilitates earlier detection and treatment of recurrent or metastatic carcinoma.

Patients receive radioiodine four to six weeks after thyroidectomy to detect and destroy any metastases and any residual tissue in the thyroid.

Following thyroidectomy, patients will need to take thyroid replacement therapy.

External beam radiation is used in the management of FTC if the cancer cannot be resected, or if there is extension into adjacent structures. Radiotherapy may also be administered postoperatively to reduce the risk of local-regional recurrence. It may also be used palliatively to treat pain from bone metastases.

Chemotherapy with cisplatin or doxorubicin has limited efficacy. It may be employed when other treatment modalities have failed.

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Question 95 of 121

A 42-year-old woman with a history of Graves' disease currently managed with a block replace regimen comes to the clinic for review; she is some four months into her treatment. On this occasion her main complaint is of a rash on both shins; it is not particularly painful, more unsightly.

On examination her BP is 135/72 mmHg, pulse is 78 and regular. You notice mild proptosis consistent with Graves' eye disease, and a rash over both tibiae which is raised, indurated and discoloured.

Investigations show:

Hb	137 g/L	(115-160)
WCC	9.9 ×10 ⁹ /L	(4-11)
PLT	203 ×10 ⁹ /L	(150-400)
Na	138 mmol/L	(135-146)
K	3.9 mmol/L	(3.5-5.0)
Cr	100 μmol/L	(79-118)

Which of the following would be the most appropriate way to manage her rash?

(0.5-4.5)

Oral azathioprineOral cyclosporinReassurance

TSH 1.2 IU/L

Oral prednisolone

Topical fluocinolone

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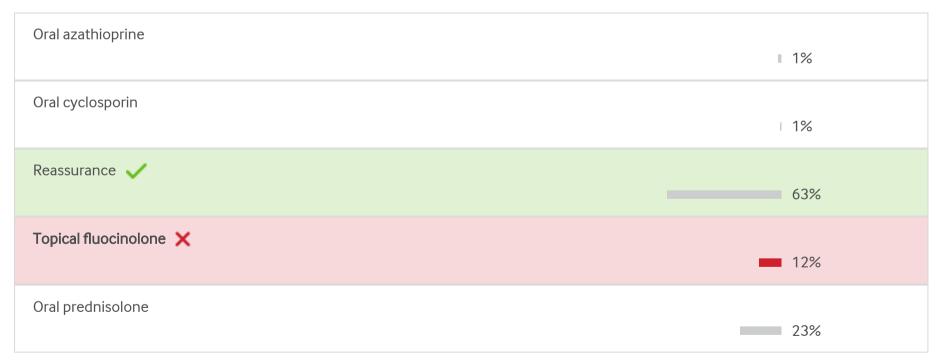
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K	3.9 mmol/L	(3.5-5.0)
Cr	100 μmol/L	(79-118)
TSH	1.2 IU/L	(0.5-4.5)

Which of the following would be the most appropriate way to manage her rash?



Endocrinology

• Pretibial myxodeama rarely require treatment.

Explanation

This patient has pretibial myxoedema, with the rash on her shins representing the typical appearance for this. No treatment is usually required, although when there is more severe localised pain, then patients may be considered for local use of a potent corticosteroid such as fluocinolone. Only very rarely are systemic corticosteroids instigated.

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Cyclosporin and azathioprine are second line immunosuppressants which have been trialled in the treatment of thyroid eye disease, but are unlikely to have a significant role in the management of pretibial myxoedema.

Systemic steroids are only rarely used for very severe disease, usually in conjunction with compression bandaging.

Topical fluocinolone is the first line treatment for pretibial myxoedema, but usually only when there is significant pain and discomfort.

Next question

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BMJ On Exam

English French

Question 96 of 121

A 25-year-old female of Bangladeshi origin presents with weight loss and fatigue of approximately four months duration. She arrived back in the United Kingdom three months ago after spending one year in Bangladesh and returned due to ill health. She has otherwise been quite well with no other past medical history, has two children, is a non-smoker and drinks no alcohol.

On examination she is thin with a BMI of 20 kg/m^2 , has obvious pigmentation of the palmar creases, has pigmentation of the buccal mucosa, a pulse of 77 bpm and a blood pressure of 100/62 mmHg. No other abnormalities are evident on examination.

Investigations show:

Haemoglobin	112 g/L	(115-165)
MCV	78 fL	(80-96)
White cell count	9 ×10 ⁹ /L	(4-11)
Serum sodium	130 mmol/L	(137-144)
Serum potassium	5 mmol/L	(3.5-4.9)
Serum urea	7.8 mmol/L	(2.5-7.5)
Serum creatinine	110 µmol/L	(60-110)
Plasma glucose	5 mmol/L	(3.0-6.0)
ESR (Westergren)	60 mm/1 st hr	(0-20)
9am plasma cortisol	90 nmol/L	(200-550)

What would be the best investigation to establish the diagnosis in this patient?

- \bigcirc Radiolabelled white cell scan
- O PA chest x ray
- CT pituitary
- O CT abdomen
- CT thorax

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



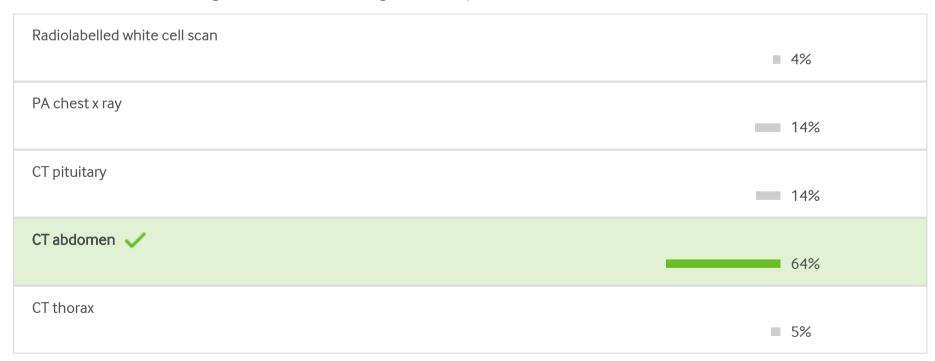
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On examination she is thin with a BMI of 20 kg/m 2 , has obvious pigmentation of the palmar creases, has pigmentation of the buccal mucosa, a pulse of 77 bpm and a blood pressure of 100/62 mmHg. No other abnormalities are evident on examination.

Investigations show:

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ESR (Westergren)	60 mm/1 st hr	(0-20)
9am plasma cortisol	90 nmol/L	(200-550)

What would be the best investigation to establish the diagnosis in this patient?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• TB adrenalitis can be diagnosed wih CT showing gland englargement predominantly

Explanation

This young woman presents after returning from a long period in Bangladesh with weight loss and lethargy. Her results are highly suggestive of a primary adrenal failure (pigmentation indicating elevated adrenocorticotropic hormone [ACTH] hence primary adrenal dysfunction), low sodium, low BP and the low random cortisol.

In this case with the high erythrocyte sedimentation rate, TB adrenalitis should be considered in the differential but also Addison's disease is still a possibility.

The most appropriate initial investigation would be confirmation of hypoadrenalism with a short Synacthen test.

From the list above a CT adrenals would be logical and absence/shrinkage or enlargement of the adrenals may be seen.

Although a CXR would be an appropriate initial investigation this may be normal despite the possibility of TB.

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BMJ OnExamination Assessment

BMJ On Exam

English French

Question 97 of 121

A 62-year-old woman comes to the diabetes nephropathy clinic for review. She is known to have a chronically elevated creatinine and microalbuminuria.

Medication includes basal bolus insulin, ramipril 10 mg, amlodipine 5 mg and bisoprolol 10 mg. Her BP is 155/72 mmHg, pulse is 72 and regular. She has neuropathy to the mid shin.

Investigations reveal:

Haemoglobin	110 g/L	(115 - 160)
White cell count	8.8 ×10 ⁹ /L	(4 - 11)
Platelets	199 ×10 ⁹ /L	(150 - 400)
Sodium	138 mmol/L	(135 - 146)
Potassium	5.2 mmol/L	(3.5 - 5)
Creatinine	299 μmol/L (240 one year earlier)	(79 - 118)

Which of the following is the correct way to manage her blood pressure?

- O Exchange her ramipril for indapamide
- Add doxazosin
- O Exchange her ramipril for doxazosin
- O Add indapamide
- O Add diltiazem

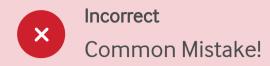
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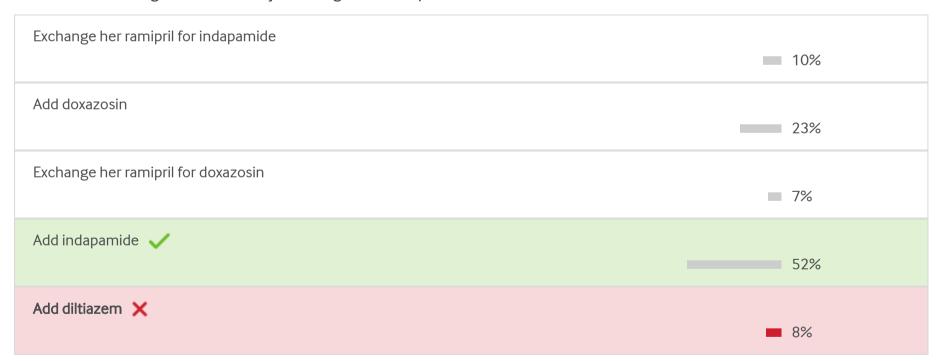
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Sodium	138 mmol/L	(135 - 146)
Potassium	5.2 mmol/L	(3.5 - 5)
Creatinine	299 μmol/L (240 one year earlier)	(79 - 118)

Which of the following is the correct way to manage her blood pressure?



Key learning points 🛭

Endocrinology

• indapamide enhance potassium excretion and not contribute to oedema and so is useful in the management of blood pressure control in chronic kidney disease

Explanation

This woman has chronic renal impairment as a result of her diabetes and her creatinine has slowly risen over the past year. The most likely explanation is progression of her diabetic nephropathy. As such the ramipril should be continued if possible.

Of the options given, indapamide is the best choice as it will enhance potassium excretion and not contribute to oedema.

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The options to exchange the ramipril for another antihypertensive are not appropriate as her ACE inhibitor should be continued if possible.

Of the other choices, only indapamide will have a positive effect on her potassium. If her potassium were in the normal range then diltiazem may be an option as small studies have demonstrated an impact on reducing proteinuria.

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BMJ On Exam

English French

Question 98 of 121

This 55-year-old male is referred with a long history of infrequent shaving and low libido.

Examination reveals the appearance as shown.



Investigations reveal:

Testosterone 6 nmol/L (9-24)

LH 22.1 mU/L (3-10)

FSH 28 mU/L (3-10)

Which of the following is the most appropriate investigation?

- O Thyroid function tests
- O Short Synacthen test
- MRI pituitary
- O Prolactin concentration
- Karyotype

Answer question Time elapsed My score Add tags Question navigator

BMJ OnExamination Assessment

BMJ On Exam

English French



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Examination reveals the appearance as shown.



Investigations reveal:

Testosterone	6 nmol/L	(9-24)
LH	22.1 mU/L	(3-10)
FSH	28 mU/L	(3-10)

Which of the following is the most appropriate investigation?

Thyroid function tests	■ 2%
Short Synacthen test	■ 3%
MRI pituitary	12%
Prolactin concentration X	— 13%
Karyotype 🗸	72%

Endocrinology, Genetics, Photographic

9/10/24, 2:00 PM

BMJ OnExamination Assessment

• Klinefelter's syndrome is suggested by hypergonadotrophic hypogonadism, gynaecomastia and low IQ.

Explanation

This patient has a hypogonadal appearance with gynaecomastia and the results demonstrate primary hypogonadism. This suggests Klinefelter's, and karyotype would be the most appropriate investigation.

Hyperprolactinaemia would cause hypogonadotrophic hypogonadism.

A magnetic resonance imaging (MRI) of the pituitary would be unhelpful as the pituitary is functioning normally.

Next question

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BMJ On Exam

English French

Question 99 of 121

A 32-year-old woman presents with a four month history of amenorrhoea.

She takes no specific therapy. She has two children and her husband has had a vasectomy.

Examination reveals an obese individual but no other abnormality.

Investigations show:

 Serum oestradiol
 100 pmol/L
 (130-500)

 Serum LH
 2.1 mU/L
 (3.0-6.6)

 Serum FSH
 2.2 mU/L
 (3.3-10.1)

 Serum prolactin
 800 mU/L
 (50-500)

 Serum testosterone
 2.1 pmol/L
 (<3.0)</td>

Which investigation is the most appropriate?

- Pregnancy test
- O Insulin tolerance test
- O Urine free cortisol concentration
- O 17 hydroxy-progesterone
- O Magnetic resonance imaging (MRI) of the pituitary

Answer question	
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BMJ On Exam

English French



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She takes no specific therapy. She has two children and her husband has had a vasectomy.

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Investigations show:

Serum oestradiol	100 pmol/L	(130-500)
Serum LH	2.1 mU/L	(3.0-6.6)
Serum FSH	2.2 mU/L	(3.3-10.1)
Serum prolactin	800 mU/L	(50-500)
Serum testosterone	2.1 pmol/L	(<3.0)

Which investigation is the most appropriate?

Pregnancy test	22%
Insulin tolerance test	■ 4%
Urine free cortisol concentration	9%
17 hydroxy-progesterone	7 %
Magnetic resonance imaging (MRI) of the pituitary 🗸	57%

Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• Hypogonadotrophic hypogonadism in the presence of raised prolactin is likely secondary to microprolactinoma

Explanation

This patient has hypogonadotrophic hypogonadism as evidenced by suppressed luteinising hormone/follicle-stimulating hormone (LH/FSH) and a low oestradiol concentration.

This would exclude pregnancy as a cause and polycystic ovarian syndrome is also unlikely.

In the presence of a raised prolactin concentration, a microprolactinoma would be the most likely explanation for this patient's symptoms and results.

This may be demonstrated by a pituitary MRI scan.

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BMJ OnExamination Assessment

An insulin tolerance test would usually be entirely normal in a microprolactinoma. Urine free cortisol concentration would be helpful to screen for Cushing's syndrome, but does not help with making the diagnosis here.

In this case, MRI is most likely to lead to the correct diagnosis.

Next question

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BMJ OnExamination Assessment

BMJ On Exam

English French

Question 100 of 121

★ High impact question

This 58-year-old gentleman is 6° 6° tall and has small testicles.



What is the likely karyotype?

- O 45 X
- O 47 XXX
- O 47 XXY
- O 47 XYY
- O 46 XY

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BMJ OnExamination Assessment

BMJ On Exam

English French



★ High impact question

This 58-year-old gentleman is 6' 6" tall and has small testicles.



What is the likely karyotype?

45 X	■ 2%
47 XXX	■ 2%
47 XXY 🗸	89%
47 XYY	■ 3%
46 XY 🗙	4 %

Key learning points

Endocrinology, Genetics, Photographic

• Klinefelter's is characterised by tall stature, small testes, azoospermia and gynaecomastia in a male. Typical karyotype is 47XXY, though mosaics occur with 46XY/47XXY karyotype.

Explanation

The picture shows gynaecomastia in a patient with a history suggesting Klinefelter's syndrome.

Klinefelter's is characterised by tall stature, small testes, azoospermia and gynaecomastia in a male.

Plasma gonadotrophins are raised.

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Typical karyotype is <u>47XXY</u>, though mosaics occur with 46XY/47XXY karyotype. There is an increased risk of breast cancer (20 times higher than a normal male).

Next question

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BMJ On Exam

English French

Question 101 of 121

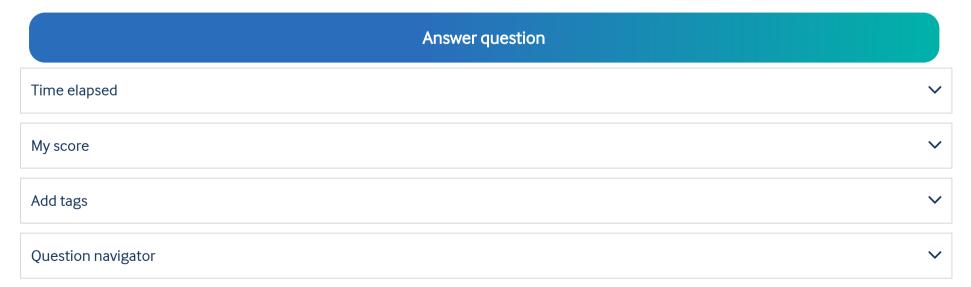
★ High impact question

The inside of a patient's mouth is shown, focusing on the inner aspect of the cheek.



Which of the following biochemical abnormalities is associated with the underlying disease?

- O Hypokalaemia
- O Low plasma aldosterone level
- O High urinary 17-hydroxy steroids
- O Low plasma renin
- O Low plasma angiotensin II level



BMJ On Exam

English French



☆ High impact question

The inside of a patient's mouth is shown, focusing on the inner aspect of the cheek.



Which of the following biochemical abnormalities is associated with the underlying disease?

Hypokalaemia	13%
Low plasma aldosterone level 🗸	55%
High urinary 17-hydroxy steroids	21%
Low plasma renin	9%
Low plasma angiotensin II level 🗶	■ 3%

Key learning points 🛭

Endocrinology, Photographic

• Addison's disease (primary hypoadrenalism) is associated with low cortisol and aldosterone levels.

Explanation

Buccal pigmentation in Addison's disease is shown.

Addison's disease (primary hypoadrenalism) is associated with:

- Low aldosterone secretion (leading to salt wasting)
- High plasma renin

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- High adrenocorticotrophic hormone (ACTH)
- High lipotropin
- Elevated plasma vasopressin, and
- Angiotensin II.

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BMJ On Exam

English French

Question 102 of 121

A 21-year-old woman is referred by her general practitioner with deteriorating hirsutism.

Since menarche at the age of 16 she has noted deteriorating facial and truncal hirsutism. She had been taking the oral contraceptive pill and had regular withdrawal bleeds up until one year ago when she stopped the pill due to weight gain. Since then she has had only one period, three months ago.

On examination her pulse was 82 beats per minute, blood pressure 128/82 mmHg and she had a BMI of 30.4 kg/m 2 .

Investigations reveal:

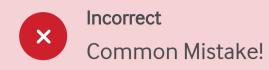
Free T4	12.8 pmol/L	(10-22)		
TSH	1.2 mU/L	(0.4-5)		
17 Beta-oestradiol	254 pmol/L	(130-850)		
LH	11.4 mU/L	(2-10)		
FSH	6.2 mU/L	(2-10)		
Prolactin	610 mU/L	(50-450)		
Testosterone	3.2 nmol/L	(<3)		
Dehydroepiandrostenedione sulphate (DHEAS)	17.2 pmol/L	(2-10)		
17-Hydroxy progesterone	3.2 pmol/L	(2-20)		
What is the most likely diagnosis?				
Adrenal carcinoma				
 Pregnancy 				
 Congenital adrenal hyperplasia 				
O Polycystic ovarian syndrome (PCOS)				
 Microprolactinoma 				
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BMJ On Exam

English French



A 21-year-old woman is referred by her general practitioner with deteriorating hirsutism.

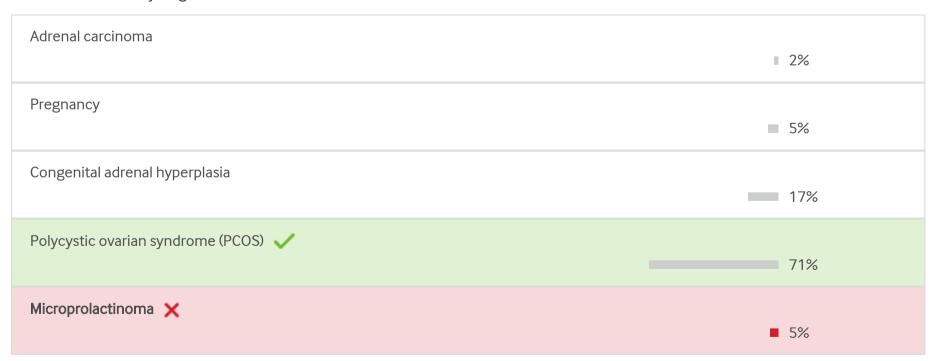
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On examination her pulse was 82 beats per minute, blood pressure 128/82 mmHg and she had a BMI of 30.4 kg/m².

Investigations reveal:

Free T4	12.8 pmol/L	(10-22)
TSH	1.2 mU/L	(0.4-5)
17 Beta-oestradiol	254 pmol/L	(130-850)
LH	11.4 mU/L	(2-10)
FSH	6.2 mU/L	(2-10)
Prolactin	610 mU/L	(50-450)
Testosterone	3.2 nmol/L	(<3)
Dehydroepiandrostenedione sulphate (DHEAS)	17.2 pmol/L	(2-10)
17-Hydroxy progesterone	3.2 pmol/L	(2-20)

What is the most likely diagnosis?



Key learning points 🛭

Endocrinology

• PCOS is associated with insulin resistance with mildly elevated tesosterone and increased LH:FSH

Explanation

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This patient is obese, has oligomenorrhoea and hirsutism.

Her investigations show a normal oestradiol with increased luteinising hormone (LH):follicle-stimulating hormone (FSH), mild hyperprolactinaemia and mildly increased androgens - typical of PCOS.

Mild hyperprolactinaemia is a typical feature of PCOS and this picture of normal oestradiol secretion with hyperandrogenism does not fit with a microprolactinoma.

An elevated 17 OHP would be expected in association with <u>congenital adrenal hyperplasia</u> (CAH).

A testosterone secreting tumour of either ovarian or adrenal origin would typically cause a testosterone concentration above 7 nmol/L and would switch off LH/FSH with consequent hypo-oestrogenism.

Markedly elevated oestrogen and prolactin would be expected at 12 weeks gestation and testosterone would be expected to be normal.

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English French

Question 103 of 121

A 15-year-old girl complained of anxiety and excessive sweating. She was not taking any medication.

(0.9-2.5)

Investigations showed:

TSH concentration 0.9 mU/L (0.5-3.4)
Free T_4 concentration 16 pmol/L (10-18)
Total T_4 concentration 180 nmol/L (55-145)
Free T_3 concentration 8.2 pmol/L (3.5-10.5)

These results are compatible with which one of the following diagnoses?

3.3 nmol/L

- O Sick euthyroid syndrome
- Thyrotoxicosis

Total T₃ concentration

- O Familial dysalbuminaemic hyperthyroxinaemia
- Factitious thyrotoxicosis
- Pregnancy

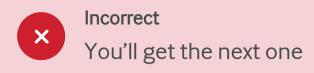


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English French



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Investigations showed:

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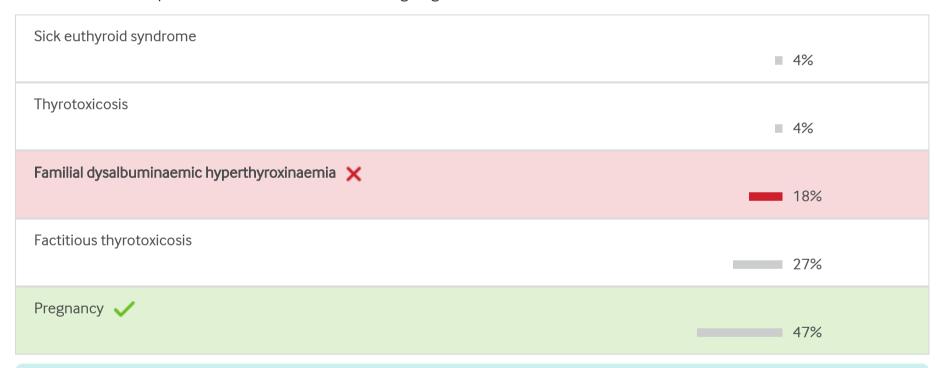
Free T_4 concentration 16 pmol/L (10-18)

Total T_4 concentration 180 nmol/L (55-145)

Free T_3 concentration 8.2 pmol/L (3.5-10.5)

Total T_3 concentration 3.3 nmol/L (0.9-2.5)

These results are compatible with which one of the following diagnoses?



Endocrinology

• Normal free thyroid hormone levels but increased total levels indicate increased binding globulins as seen in pregnancy

Explanation

The symptom complex is intentionally misleading.

The patient has a normal TSH and normal free T3 and T4 concentrations, excluding thyrotoxicosis but elevated total concentrations suggesting a rise in the binding globulins.

This can occur in pregnancy.

Sick euthyroidism would be typically associated with low thyroid hormone concentrations.

Next question

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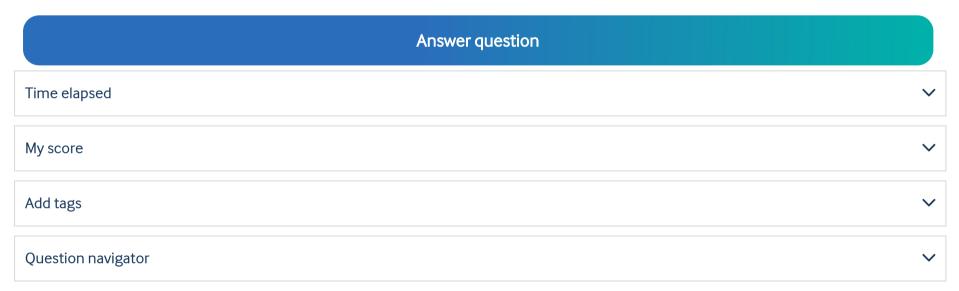
Question 104 of 121

A 25-year-old woman with a history of infertility and severe reflux symptoms presented with raised calcium at 2.80 mmol/l. The PTH was elevated.

What is the diagnosis?

_		
\cap	Vitamin I	D
()	vitamini	

- O MEN 1 syndrome
- O MEN 2a syndrome
- O Primary hyperparathyroidism
- O Peutz-Jeghers' syndrome



BMJ On Exam

English French



A 25-year-old woman with a history of infertility and severe reflux symptoms presented with raised calcium at 2.80 mmol/l. The PTH was elevated.

What is the diagnosis?



Key learning points 🛭

Endocrinology

• MEN syndromes and screening.

Explanation

Multiple endocrine neoplasia (MEN) is characterised by

MEN 1:

- Parathyroid hyperplasia, pancreatic endocrine tumours (gastrinoma, insulinoma, VIP-oma), pituitary adenomas (<u>prolactinoma</u>, <u>acromegaly</u>)
- Autosomal dominant, high penetrance
- Germline and somatic mutation at chromosome 11q13.
- Many different mutations described makes screening challenging.

MEN 2a:

• Medullary thyroid cancer (MTC), phaeochromocytoma and parathyroid tumours.

MEN 2b:

- MTC, phaeochromocytoma, mucosal ganglioneuromatosis, marfanoid habitus
- Mucosal ganglioneuromatosis is characterised by nodules on the tongue.

MEN 2 conditions are autosomal dominant due to mutations at 10q11 causing formation of the ret oncogene.

Biochemical screen with annual calcium, calcitonin and urinary metaphrines, and MRI adrenals every three years are needed.

Next question

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BMJ On Exam

English French

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Question 105 of 121

★ High impact question

A 36-year-old man comes to see you with his wife after failing to conceive after 10 years of marriage.

Examination reveals that he his tall, thin and has bilateral gynaecomastia. A colleague has arranged some preliminary investigations, one of which has returned showing high levels of urinary gonadotrophins.

What is the most likely diagnosis?

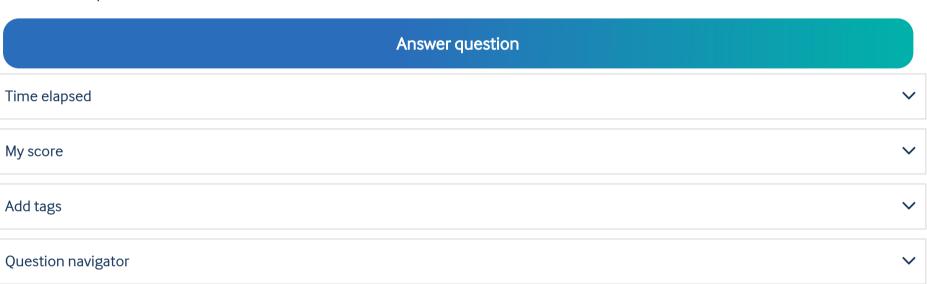
Noonan's syndrome

\circ	Gaucher's disease
\circ	Noonan's syndron

\bigcirc	Marfan syndrome
\bigcirc	Marfan syndrom







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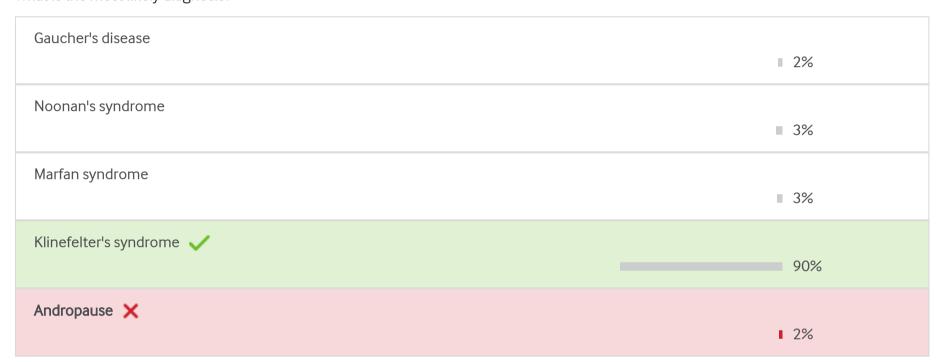


☆ High impact question

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Examination reveals that he his tall, thin and has bilateral gynaecomastia. A colleague has arranged some preliminary investigations, one of which has returned showing high levels of urinary gonadotrophins.

What is the most likely diagnosis?



Key learning points 🛭

Endocrinology, Genetics

• Infertility and gynaecomastia are two of the most common features resulting in a diagnosis of Klinefelter's syndrome.

Explanation

Gaucher's and Marfan syndrome do not present with infertility.

Noonan's is associated with short stature.

Klinefelter's is a sex chromosome disorder affecting 1:400 - 1:600 male births typically with 47 XXY, XXXYY or XXYY.

Andropause is the term for the gradual decrease in serum testosterone concentration with age, but does not occur, usually, until after the age of 50.

Next question

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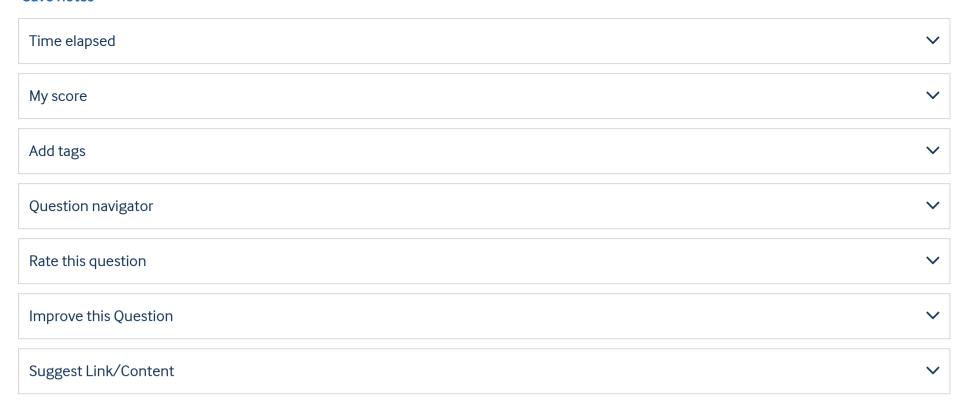
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Question 106 of 121

A 61-year-old man attends clinic for review with increasing tiredness and lethargy over a few months. He has a history of chronic renal failure, (having attended the renal clinic for five years), and type 1 diabetes.

On examination his BP is 135/75 mmHg, his pulse is 70 and regular. He has pale conjunctivae and there is peripheral neuropathy with sensory loss over the soles of both feet.

Investigations show:

Haemoglobin	117 g/L	(135-177)
White cell count	8.1 ×10 ⁹ /L	(4-11)
Platelets	199 ×10 ⁹ /L	(150-400)
Sodium	138 mmol/L	(135-146)
Potassium	5.3 mmol/L	(3.5-5)
Creatinine	210 μmol/L	(79-118)
Alkaline phosphatase	165 U/L	(39-117)
Calcium	2.05 mmol/L	(2.20-2.61)
PTH	22 pmol/L	(1.2-7.6)

Which of the following is the most likely underlying diagnosis?

- $\bigcirc \qquad {\sf Pseudohypoparathyroidism}$
- O Primary hyperparathyroidism
- O Tertiary hyperparathyroidism
- Secondary hyperparathyroidism
- Hypoparathyroidism

	Answer question
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Alkaline phosphatase	165 U/L	(39-117)
Calcium	2.05 mmol/L	(2.20-2.61)
PTH	22 pmol/L	(1.2-7.6)

Which of the following is the most likely underlying diagnosis?

Pseudohypoparathyroidism	
	■ 5%
Primary hyperparathyroidism	
	■ 3%
Tertiary hyperparathyroidism	
	16%
Secondary hyperparathyroidism 🗸	
	74%
Hypoparathyroidism X	
	■ 2%

Endocrinology

• hypoparathyroidism leads to low PTH and low ionised calcium levels

Explanation

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This patient has chronic renal failure and hypocalcaemia with a raised parathyroid hormone (PTH) which is greater than twice the upper limit of the normal range. This is consistent with a diagnosis of secondary hyperparathyroidism.

<u>Secondary hyperparathyroidism</u> arises in established renal failure due lack of vitamin D production and reduced ability to absorb and retain calcium.

<u>Hypoparathyroidism</u> is associated with low PTH levels so this cannot be the diagnosis.

<u>Pseudohypoparathyroidism</u> is associated with short stature and shortening of the fifth metacarpal.

<u>Primary hyperparathyroidism</u> is associated with either parathyroid hyperplasia or a parathyroid producing adenoma, and not with renal impairment.

Tertiary hyperparathyroidism occurs when PTH production becomes autonomous and levels do not fall once serum calcium is corrected with supplementation of calcium and vitamin D.

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Question 107 of 121

☆ High impact question

A 33-year-old female is referred to clinic by her GP with tiredness and lethargy of approximately three months duration.

She was diagnosed with an underactive thyroid two years ago by her GP and was commenced on 150 μ g of thyroxine daily. She has two young children and had been well up until the birth of her last child six months ago and has since been feeling increasingly tired with weight gain.

She is a smoker of five cigarettes daily and drinks modest quantities of alcohol. Her mother is also receiving thyroxine replacement therapy for an underactive thyroid.

Examination reveals a pulse of 82 beats per minute, a blood pressure of 124/74 mmHg and no goitre is palpable. No abnormalities are noted.

Investigations reveal:

Haen	noglobin	120 g/L	(115-165)
White	e cell count	6.1 ×10 ⁹ /L	(4-11)
Plate	lets	235 ×10 ⁹ /L	(150-400)
Serui	m sodium	141 mmol/L	(137-144)
Serui	m potassium	3.4 mmol/L	(3.5-4.9)
Serum urea		3.7 mmol/L	(2.5-7.5)
Serui	m creatinine	87 μmol/L	(60-110)
Free	T4	18.1 pmol/L	(10-22)
Free T3		4.8 pmol/L	(5-10)
TSH		25.8 mU/L	(0.4-5.0)
Thyroid peroxidase antibody Strongly positive		ve	
What is the most likely cause for this woman's presentation?			
O Non-compliance with thyroxine			
O Dysthyroglobulinaemia			
\circ	 Secondary hypothyroidism 		
\circ	O De Quervain's thyroiditis		
0	TSH feedback adenoma		

Answer question V

Time elapsed

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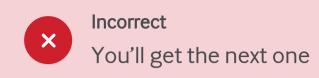
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Serum urea	3.7 mmol/L	(2.5-7.5)
Serum creatinine	87 μmol/L	(60-110)
Free T4	18.1 pmol/L	(10-22)
Free T3	4.8 pmol/L	(5-10)
TSH	25.8 mU/L	(0.4-5.0)
Thyroid peroxidase antibody	Strongly positive	

What is the most likely cause for this woman's presentation?

Non-compliance with thyroxine 🗸	70%
Dysthyroglobulinaemia	10%
Secondary hypothyroidism	7 %
De Quervain's thyroiditis	9%
TSH feedback adenoma 🗶	5 %

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Endocrinology

• Raised TSH with elevated thyroid hormone levels in someone know to have hypothyroidism is likely due to non-compliance

Explanation

Non-compliance is the most likely cause for this woman's deranged thyroid function tests with normal thyroxine (T4) and a practically normal tri-iodothyronine (T3) but elevated thyroid-stimulating hormone (TSH) reflecting that she has just remembered to take thyroxine prior to her outpatient visit.

A TSH feedback adenoma is exceedingly rare and associated with long term untreated hypothyroidism resulting in the development of a pituitary TSH adenoma.

Secondary hypothyroidism would not be associated with a raised TSH.

De Quervain's thyroiditis is a subacute thyroiditis.

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English French

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Question 108 of 121

A 22-year-old male attends the Emergency department accompanied by very worried parents.

They claim that their son has lately become increasingly aggressive and unusually suspicious of them. He is convinced that the neighbours are after him because they hate him. He also has quarrelled with many of his friends accusing them to be trying to steal his girlfriend. His parents are convinced that these symptoms may be due to a very strict diet he is doing in order to take part in a sport competition.

The patient is oriented to time, place and person. His past medical history is unremarkable and he denies taking any medication.

On examination, the patient is well built with no abnormal findings except for nodulocystic acne on his face and back.

What is the most likely cause of this patient's abnormal behaviour?

\circ	Corticosteroid abuse	
\bigcirc	Paranoid schizophrenia	
\bigcirc	Anorexia nervosa	
\bigcirc	Bipolar disorder	
0	Exogenous androgens	
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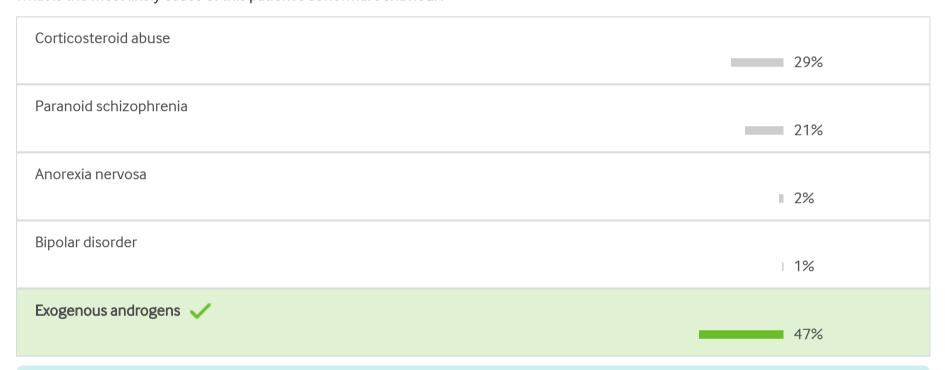
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The patient is oriented to time, place and person. His past medical history is unremarkable and he denies taking any medication.

On examination, the patient is well built with no abnormal findings except for nodulocystic acne on his face and back.

What is the most likely cause of this patient's abnormal behaviour?



Key learning points 💡



Endocrinology, Pharmacology, Psychiatry

• Abuse of androgenic steroids can cause paranoid dellusions and aggression.

Explanation

The abuse of androgenic steroids amongst people who practise certain sports is quite common.

Paranoid delusions and aggressive behaviour are side effects of his medication.

Other side effects of these illicit drugs include:

- Acne
- Gynaecomastia (also increase in breast cancer risk)
- Hypertension
- Hypercholesterolaemia, and
- Hepatic tumours.

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English French

Question 109 of 121

☆ High impact question

A 16-year-old girl is brought to the Emergency department by her parents.

She has a two day history of general malaise, vomiting and vague abdominal discomfort. Over the past twelve hours she has become increasingly drowsy.

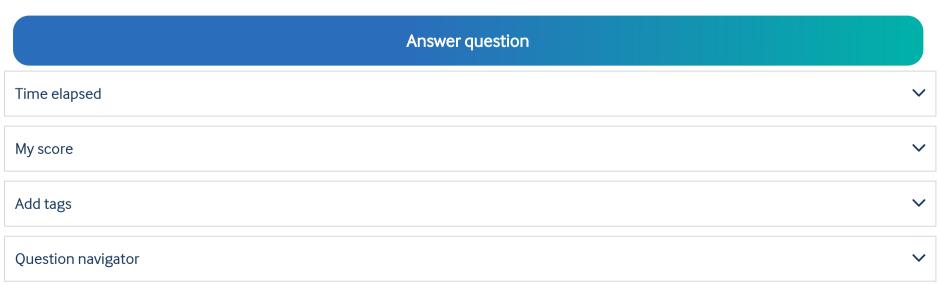
On examination she was unresponsive to verbal commands. Her temperature 36.5°C, BP 74/48 mmHg.

Investigations revealed:

Sodium	121 mmol/L	(137-144)
Potassium	6.2 mmol/L	(3.5-4.9)
Urea	11.6 mmol/L	(2.5-7.5)
Creatinine	162 μmol/L	(60-110)
Glucose	1.1 mmol/L	(3.0-6.0)
Chloride	91 mmol/L	(95-107)
Bicarbonate	14 mmol/L	(20-28)

After giving emergency treatment, what single investigation would be of most value in confirming the diagnosis?

- O CT scan abdomen
- O Insulin + C peptide levels
- O Tetracosactrin (Synacthen) test
- Autoantibody screen
- Fasting blood glucose



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English French



★ High impact question

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Glucose	1.1 mmol/L	(3.0-6.0)
Chloride	91 mmol/L	(95-107)
Bicarbonate	14 mmol/L	(20-28)

After giving emergency treatment, what single investigation would be of most value in confirming the diagnosis?



Emergency Medicine, Endocrinology

• Short synacthen test will confirm diagnosis of Addison's disease

Explanation

The patient has presented with an Addisonian crisis.

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A definitive diagnosis is made with a Synacthen test.

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Question 110 of 121

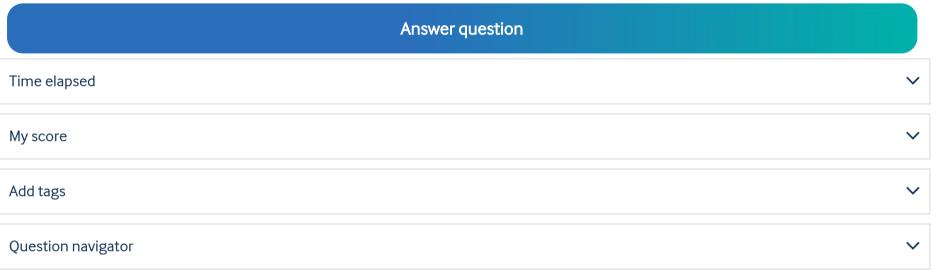
A 77-year-old lady is rushed to hospital after having been found unresponsive by her children.

On examination the patient has a GCS of 8, she is obese and her skin has a yellowish hue. Her pulse is 50 beats per minute and her temperature is 35°C. Her heart sounds are normal and the ECG is unremarkable except for a rate of 49 bpm.

Auscultation of the chest reveals coarse crepitations and generally decreased air entry bilaterally.

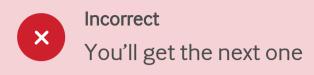
What is the most likely diagnosis?

\bigcirc	Catatonia
\circ	Pneumonia
\circ	Myxoedema coma
\circ	Subdural haemorrhage
\circ	Psychotic depression



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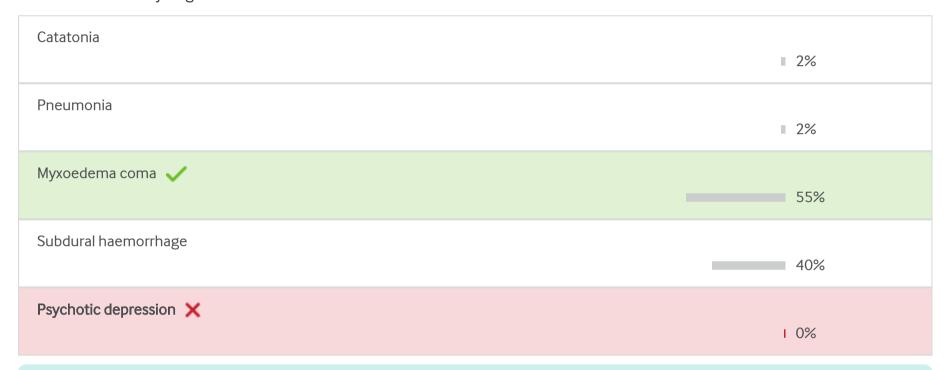


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Auscultation of the chest reveals coarse crepitations and generally decreased air entry bilaterally.

What is the most likely diagnosis?



Key learning points 🛭

Endocrinology

• Hypothyroidism can present as a medical emergency with myxoedema coma

Explanation

Myxoedema coma is a rare but very important to diagnose medical emergency.

The clues toward this diagnosis are:

- 'yellowish hue' (referring to carotinaemia)
- obesity
- <u>bradycardia</u>
- <u>hypothermia</u>, and
- coma.

This could easily have been a case of chronic hypothyroidism that was precipitated by an acute bronchitis.

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English French

Question 111 of 121

A 17-year-old male presents to the Emergency department with pneumonia.

He suffers from classical congenital adrenal hyperplasia (CAH) due to 21-hydroxylase deficiency.

Current medication includes prednisolone 7.5 mg daily and fludrocortisone 100 mcg/day.

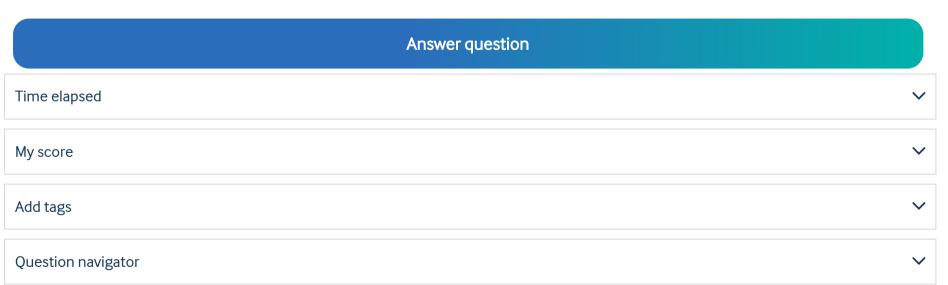
On examination his temperature is 38.2°C, BP is 90/65 mmHg, pulse is 95 and regular. He has signs of left lower lobe pneumonia.

Investigations show:

Haemoglobin	139 g/L	(135-177)
White cell count	13.3 ×10 ⁹ /L	(4-11)
Platelets	204 ×10 ⁹ /L	(150-400)
Sodium	133 mmol/L	(135-146)
Potassium	5.0 mmol/L	(3.5-5)
Creatinine	122 μmol/L	(79-118)

What would you advise with respect to management of his steroid therapy?

- O He should keep his dose of oral corticosteroids the same and double the dose of his mineralocorticoids
- O He should maintain his current dose of corticosteroids
- O He should transition to IV hydrocortisone and maintain his mineralocorticoid dose
- O He should increase his dose of oral corticosteroids by 50% and keep the mineralocorticoid dose the same
- O He should double his dose of oral corticosteroids and oral mineralocorticoids

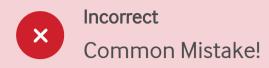


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 Sodium
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 Potassium
 5.0 mmol/L (3.5-5)

 Creatinine
 122 μmol/L (79-118)

What would you advise with respect to management of his steroid therapy?

Endocrinology

• Leaving both corticosteroid and mineralocorticoid dose unchanged is inappropriate in patients on long term steroids who present with infections.

Explanation

Given this patient has a relatively severe pneumonia and is hypotensive, the most appropriate action is to convert him temporarily to IV glucocorticoids, conventionally 50-100 mg of hydrocortisone six hourly. The dose of mineralocorticoid is maintained.

For milder concurrent illnesses oral prednisolone is usually doubled for a few days.

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Mineralocorticoid dose is always left unchanged.

Leaving both corticosteroid and mineralocorticoid dose unchanged is inappropriate.

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English French

Question 112 of 121

A 36-year-old woman with type 1 diabetes is seen with a community acquired pneumonia. She has a temperature of 38.5 degrees Celsius and has been feeling unwell for the last two days. She is managing to eat and drink but not to her usual amounts. Her CRB-65 score is zero and she is managed with oral antibiotics at home.

She is on a basal bolus insulin regimen and her total daily insulin dose is 40 units. You advise her to monitor her blood glucose and urinary ketone levels every four hours.

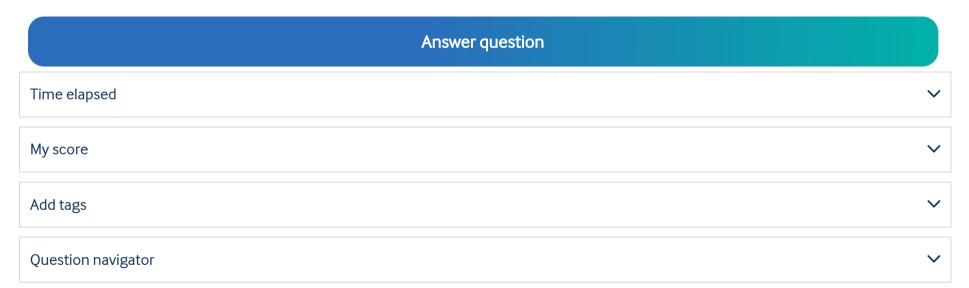
If she starts vomiting, is unable to keep fluids down, or is unable to control her blood sugar or ketone levels, she is advised to seek urgent medical advice.

She contacts the surgery the following day as her blood sugar has risen to 15 mmol/L and she has 1+ of ketones in her urine. She drinking plenty of sugar free fluids and is not vomiting and has been able to eat carbohydrates. She does not feel any more unwell than yesterday.

Which of the following is the most appropriate advice to give in this situation?

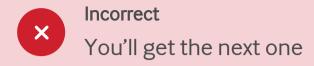
- O Give an additional 4 units of rapid-acting insulin every 4 hours and continue to test blood glucose and urinary ketones every 4 hours. If her blood glucose is more than 13 mmol/L and ketones are present she should recontact for advice
- Reduce oral carbohydrate intake, keep insulin dose the same, and continue to check glucose and ketones levels 4 hourly.

 Recontact for advice if more unwell, blood glucose goes above 20, or ketones are 2+ or more
- Give an additional 8 units of rapid-acting insulin every 4 hours and continue to test blood glucose and urinary ketones every 4 hours. If her blood glucose is more than 13 mmol/L and ketones are present she should recontact for advice
- Reduce insulin dose by 50% and continue to monitor blood glucose and urinary ketones every 4 hours. If blood glucose or urinary ketones worsen she should recontact for advice
- O Continue the same insulin dose and continue to check glucose and ketones levels 4 hourly. If blood glucose goes above 20 mmol/L or ketones are 2+ or more she should recontact for advice



BMJ On Exam

English French



A 36-year-old woman with type 1 diabetes is seen with a community acquired pneumonia. She has a temperature of 38.5 degrees Celsius and has been feeling unwell for the last two days. She is managing to eat and drink but not to her usual amounts. Her CRB-65 score is zero and she is managed with oral antibiotics at home.

She is on a basal bolus insulin regimen and her total daily insulin dose is 40 units. You advise her to monitor her blood glucose and urinary ketone levels every four hours.

If she starts vomiting, is unable to keep fluids down, or is unable to control her blood sugar or ketone levels, she is advised to seek urgent medical advice.

She contacts the surgery the following day as her blood sugar has risen to 15 mmol/L and she has 1+ of ketones in her urine. She drinking plenty of sugar free fluids and is not vomiting and has been able to eat carbohydrates. She does not feel any more unwell than yesterday.

Which of the following is the most appropriate advice to give in this situation?

Give an additional 4 units of rapid-acting insulin every 4 hours and continue to test blood glucose and urinary ketones every 4 hours. If her blood glucose is more than 13 mmol/L and ketones are present she should recontact for advice

57%

Reduce oral carbohydrate intake, keep insulin dose the same, and continue to check glucose and ketones levels 4 hourly. Recontact for advice if more unwell, blood glucose goes above 20, or ketones are 2+ or more

16%

Give an additional 8 units of rapid-acting insulin every 4 hours and continue to test blood glucose and urinary ketones every 4 hours. If her blood glucose is more than 13 mmol/L and ketones are present she should recontact for advice

8%

Reduce insulin dose by 50% and continue to monitor blood glucose and urinary ketones every 4 hours. If blood glucose or urinary ketones worsen she should recontact for advice

■ 2%

Continue the same insulin dose and continue to check glucose and ketones levels 4 hourly. If blood glucose goes above 20 mmol/L or ketones are 2+ or more she should recontact for advice X

17%

Key learning points 🛭

Diabetes, Endocrinology

• During periods of illness, type 1 diabetics should test their blood sugar and ketone levels at least 4 hourly.

Explanation

A key part of counselling a diabetic started on insulin is what to do if they are unwell. For type 1 diabetics, if they are unwell they should regularly test their blood glucose and ketones. This should be done at least every 4 hours.

For this question we have used the TREND UK (Training, research and education for nurses in diabetes UK) and Leicestershire NHS insulin guidelines.

The TREND UK guidance advises that if blood glucose is less than 13 mmol/L and no ketones are present then insulin should be taken as normal; if blood glucose is more than 13 mmol/L and ketones are present then insulin adjustment is needed.

The Leicestershire NHS guidance is identical aside from it using a cut-off of 11 mmol/L rather than 13 mmol/L.

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Essentially, this patient needs an additional 10% of her daily insulin dose as rapid acting insulin every four hours, and then four hourly glucose and ketone monitoring to guide ongoing dosage/management.

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English French

Question 113 of 121

A 52-year-old female presents with weight loss, anxiety and difficulty sleeping. She had been taking combined cyclical oestrogen/progesterone hormone replacement therapy over the last two years.

On examination she was noted to have a body mass index of 26.5 kg/m^2 , a pulse of 104 beats per minute and a blood pressure of 112/72 mmHg. No goitre was palpable and eye movements were entirely normal. She was noted to have weakness of the proximal musculature of the shoulder and hip girdles. Abdominal examination revealed a palpable splenic tip.

Initial investigations revealed the following:

Serum total thyroxine 250 nmol/L (60-140)

Plasma TSH <0.1 mU/L (0.4-5.0)

Serum alkaline phosphatase 202 U/L (45-105)

Serum gamma glutamyl transferase 30 U/L (4-35)

Her general practitioner commenced her on carbimazole 10 mg tds together with propranolol 120 mg BD. At review six weeks later the patient appeared clinically euthyroid. Repeat investigations showed:

Free thyroxine 180 nmol/L
Plasma TSH 2.2 mU/L
Serum alkaline phosphatase 160 U/L
Serum gamma glutamyl transferase 36 U/L

The dose of carbimazole was decreased to 20 mg daily. After one year the GP decided to refer her to endocrine outpatients. Two weeks before she had a chest infection treated with erythromycin. Her blood test results showed:

Serum thyroxine 80 nmol/L Plasma TSH 10.8 mU/L Serum alkaline phosphatase 102 U/L

Which of the following would be the most appropriate, next investigation?

- O Isoenzymes of alkaline phosphatase
- Albumin
- Thyroid antibodies
- Full blood count
- O Serum free thyroxine

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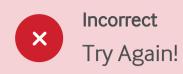
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BMJ On Exam

English French



A 52-year-old female presents with weight loss, anxiety and difficulty sleeping. She had been taking combined cyclical oestrogen/progesterone hormone replacement therapy over the last two years.

On examination she was noted to have a body mass index of 26.5 kg/m^2 , a pulse of 104 beats per minute and a blood pressure of 112/72 mmHg. No goitre was palpable and eye movements were entirely normal. She was noted to have weakness of the proximal musculature of the shoulder and hip girdles. Abdominal examination revealed a palpable splenic tip.

Initial investigations revealed the following:

Serum total thyroxine 250 nmol/L (60-140)

Plasma TSH <0.1 mU/L (0.4-5.0)

Serum alkaline phosphatase 202 U/L (45-105)

Serum gamma glutamyl transferase 30 U/L (4-35)

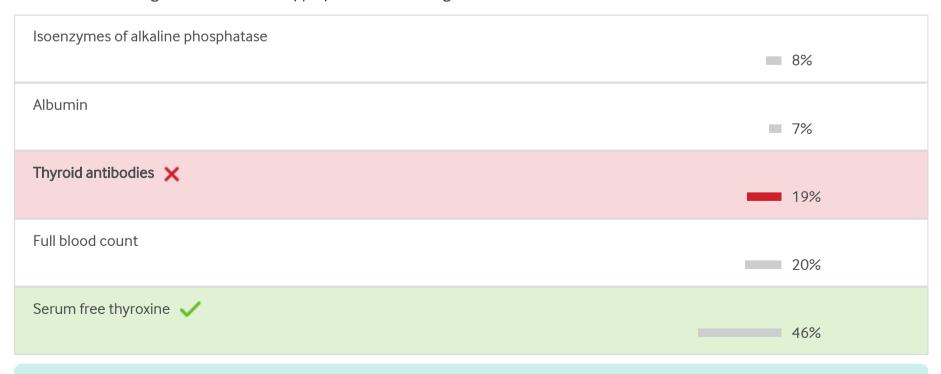
Her general practitioner commenced her on carbimazole 10 mg tds together with propranolol 120 mg BD. At review six weeks later the patient appeared clinically euthyroid. Repeat investigations showed:

Free thyroxine 180 nmol/L
Plasma TSH 2.2 mU/L
Serum alkaline phosphatase 160 U/L
Serum gamma glutamyl transferase 36 U/L

The dose of carbimazole was decreased to 20 mg daily. After one year the GP decided to refer her to endocrine outpatients. Two weeks before she had a chest infection treated with erythromycin. Her blood test results showed:

Serum thyroxine 80 nmol/L Plasma TSH 10.8 mU/L Serum alkaline phosphatase 102 U/L

Which of the following would be the most appropriate, next investigation?



Endocrinology

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• Oestrogen therapy causes raised thyroxie binding globulin, effecting total thyroid hormone levels.

Explanation

Her most recent thyroid-stimulating hormone (TSH) is high, suggesting hypothyroidism. The serum total thyroxine is, however, within the normal range.

It is stated in the question that this patient is receiving oestrogen/progesterone HRT. Thyroxine is mostly bound to thyroxine binding globulin in the circulation. Oestrogen therapy is associated with elevation of thyroxine binding globulin in the serum.

Thus the total serum thyroxine may be misleading in this case, and serum free thyroxine will confirm whether this patient is hypothyroid or euthyroid.

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BMJ On Exam

English French

Question 114 of 121

A 61-year-old woman comes to the clinic demanding therapy with liraglutide in addition to her current metformin 850 mg PO TDS.

You are concerned about satisfying prescribing conditions under current NICE guidance.

Which of the following would be a criterion under which you could consider liraglutide for her?

- O Hypertriglyceridaemia
- O HbA_{1c} 56 mmol/mol (7.3%)
- O BMI 36
- O Previous history of pancreatitis
- O BP 145/82 mmHg on two agents



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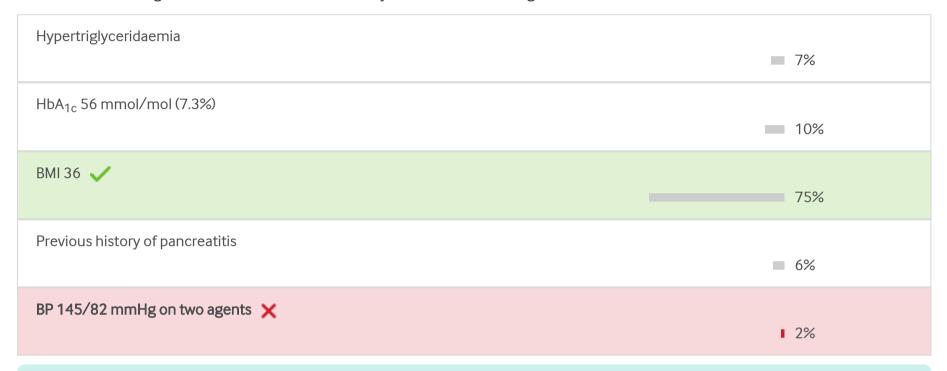
English French



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You are concerned about satisfying prescribing conditions under current NICE guidance.

Which of the following would be a criterion under which you could consider liraglutide for her?



Key learning points 🛛



Endocrinology

• Liraglutide can only be used in patients of BMI >35 who are of European descent in combination with metformin.

Explanation

NICE guidance recommends use of liraglutide only in patients of BMI >35 who are of European descent. When it comes to use in dual therapy, if they cannot take one of metformin or a sulphonylurea, pioglitazone is contraindicated and they are unsuitable for a DPPIV inhibitor.

Whilst other metabolic risk factors apart from obesity are recognised as a consideration when prescribing liraglutide, they are subsidiary to weight and contraindications to other medication in the prescribing decision.

BP 145/82 mmHg on two agents also represents relatively good control, and hypertriglyceridaemia may be associated with increased pancreatitis, which is known to be associated with GLP-1 therapy.

Next question

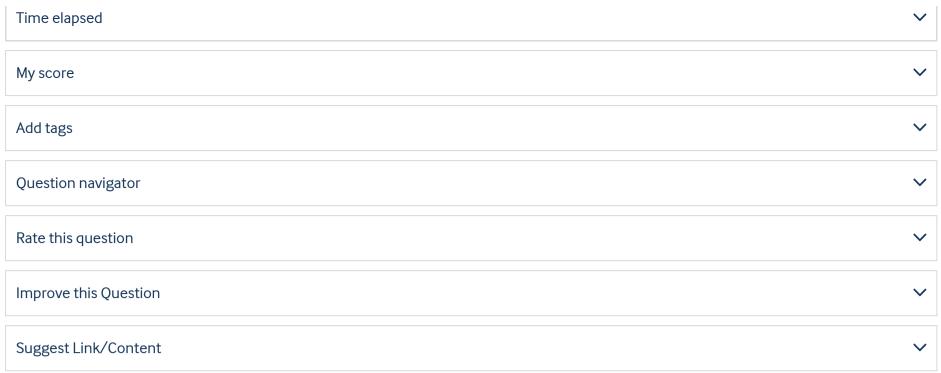
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BMJ On Exam

English French

Question 115 of 121

☆ High impact question

A 52-year-old woman has thyroid function tests as follows:

TSH <0.03 IU/L (0.5-4.5)

fT4 18.8 pmol/L (12.0-16.0)

fT3 6.2 pmol/L (3.5-5.0)

What is the most likely diagnosis?

- Over-replacement with thyroxine
- O Subclinical hypothyroidism
- O Sick euthyroid syndrome
- O TSH-secreting tumour
- Untreated hypopituitarism

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



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fT3 6.2 pmol/L (3.5-5.0)

What is the most likely diagnosis?



Key learning points 🛛



Endocrinology, Thyroid

• Hypothyroidism and interpretation of thyroid function tests

Explanation

This is a very common pattern of thyroid function tests. The main differential diagnosis is subclinical hyperthyroidism, overreplacement with thyroxine, and drug treatment with steroids, amiodarone or lithium.

The other clinical situations have different patterns on thyroid function testing:

Situation **TSH** fT4 fT3

Over-replacement with thyroxine Low Normal/High High Normal/Low Sick euthyroid syndrome Normal/High Low Subclinical hypothyroidism High Normal Normal TSH-secreting tumour High High High

Low/Low normal Low/Low normal Untreated <u>hypopituitarism</u>

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BMJ On Exam

English French

Question 116 of 121

☆ High impact question

A 15-year-old female presents with primary amenorrhoea.

She is accompanied by her mother who explains that she has also lost approximately 10 kg of weight over the last year and has occasional episodes of diarrhoea. She has recently become a vegetarian and tends to favour wheat snacks and bread.

Her progress at school has been excellent, she plays the piano in the school orchestra and she regularly goes jogging several times a day. She has a younger brother who is well and her mother and maternal aunt have a past history of hyperthyroidism. Her parents divorced about two years ago and she sees her father infrequently. She takes no medication.

On examination she is thin with a BMI of 16.6 kg/m^2 and appears phenotypically female. She has normal breast development with no galactorrhoea to expression, has absence of axillary and scanty pubic hair.

Investigations reveal the following

Plasma oestradiol	70 pmol/L	(130-550)
LH	3.5 mU/L	(2-10)
FSH	4.0 mU/L	(2-10)
17 Hydroxyprogesterone	5.2 nmol/L	(3-15)
Free T4	12.4 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
Prolactin	520 mU/L	(50-500)

What is the most likely diagnosis?

Thyrotoxicosis

 \bigcirc

Microprolactinoma

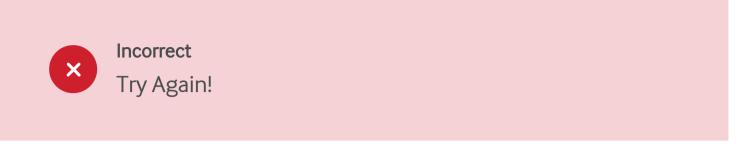
Pregnancy

- O Coeliac disease
- Anorexia nervosa

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



★ High impact question

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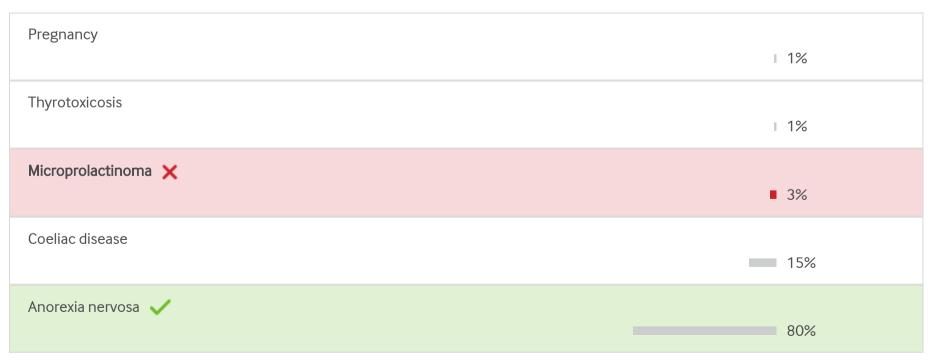
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Free T4	12.4 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
Prolactin	520 mU/L	(50-500)

What is the most likely diagnosis?



Endocrinology

• Anorexia nervosa may present with hypogonadotrophic hypogonadism and mildly elevated prolactin.

Explanation

This patient is likely to have <u>anorexia nervosa</u> as reflected by the low BMI, excessive exercise and amenorrhoea due to hypogonadotrophic hypogonadism.

The mild hyperprolactinaemia is often a feature of anorexia and at this level would be unlikely to be due to a microprolactinoma.

Pregnancy would be associated with elevated oestradiol concentrations.

This is unlikely to be <u>coeliac disease</u> based on the endocrine abnormalities.

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BMJ On Exam

English French

Question 117 of 121

A 28-year-old female presents in the 24th week of pregnancy with profound tiredness and anxiety. Examination reveals a tremor, a pulse of 100 beats per minute and a soft bruit heard over the thyroid gland.

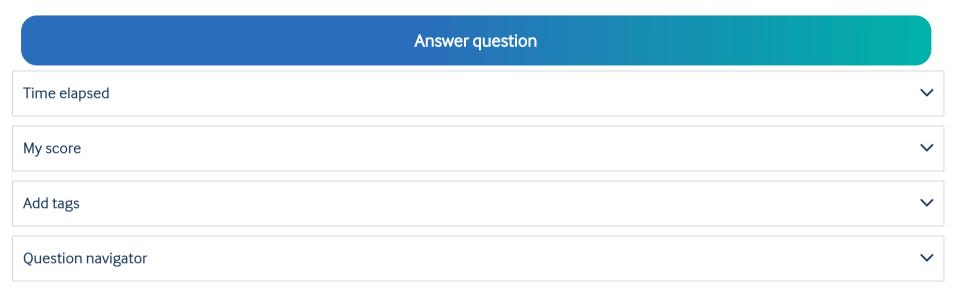
Thyroid function tests show:

Free T4 32.9 pmol/L (10-22)

TSH 0.04 mU/L (0.4-5)

Which of the following treatments would you select for this patient?

- Carbimazole
- O Potassium perchlorate
- O Radioactive iodine therapy
- Propylthiouracil
- Propanolol



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English French



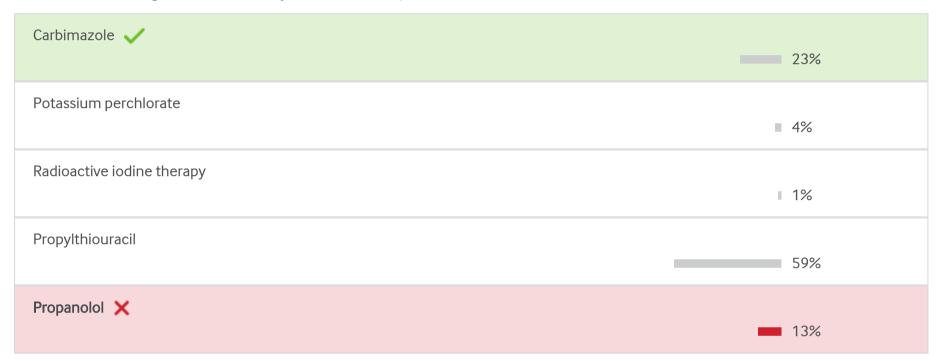
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Thyroid function tests show:

Free T4 32.9 pmol/L (10-22)

TSH 0.04 mU/L (0.4-5)

Which of the following treatments would you select for this patient?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• Propylthiouracil may be used in pregnancy

Explanation

This patient has Graves' disease and the most appropriate treatment for the thyrotoxicosis is Carbimazole. She should receive in the lowest dose to maintain euthyroidism.

A block and replacement regime is not appropriate in pregnancy.

Radioactive iodine is contraindicated as it would also be taken up by the fetal thyroid.

Propranolol would ameliorate the symptoms but may impact upon the fetus.

Lithium is contraindicated in pregnancy as is potassium perchlorate.

Of course surgery may also be used in severe cases.

Due to the small risk of fetal abnormalities with carbimazole it is recommended to use PTU in the first trimester during organogenesis and then carbimazole in trimester 2 + 3.

Further Reading:

O'Doherty MJ, McElhatton PR, Thomas SH. <u>Treating thyrotoxicosis in pregnant or potentially pregnant women</u>. *BMJ.* 1999;318:5.

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BMJ On Exam

English French

Question 118 of 121

☆ High impact question

A 52-year-old man presents for review of rosacea complaining of polyuria and polydipsia.

His rosacea has been treated with tetracycline based antibiotics for the past three months and he has hypertension for which he takes amlodipine.

On examination his pulse is 85 and regular, BP is 110/70 mmHg. He has a skin rash consistent with rosacea but nil else of note. His BMI is 28.

Investigations show:

Haemoglobin 147 g/L (135-177)White cell count $5.1 \times 10^9 / L$ (4-11)198 ×10⁹/L (150-400)Platelets Sodium 147 mmol/L (135-146) 4.9 mmol/L Potassium (3.5-5)Creatinine 122 μmol/L (79-118)Fasting glucose 6.0 mmol/L (4.0-7.0)

Which of the following is the investigation most likely to reveal the underlying diagnosis?

- O Glucose tolerance test
- Synacthen test
- Ultrasound abdomen
- Water deprivation test
- Serum calcium

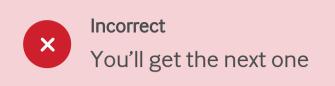
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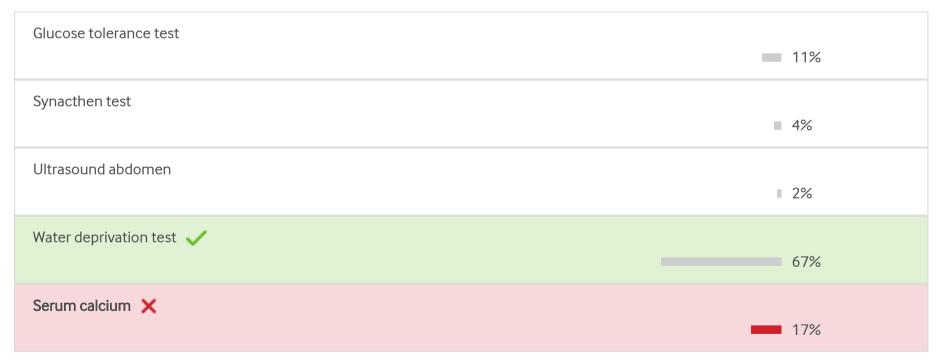
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Investigations show:

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Platelets	198 ×10 ⁹ /L	(150-400)
Sodium	147 mmol/L	(135-146)
Potassium	4.9 mmol/L	(3.5-5)
Creatinine	122 μmol/L	(79-118)
Fasting glucose	6.0 mmol/L	(4.0-7.0)

Which of the following is the investigation most likely to reveal the underlying diagnosis?



Endocrinology

• Long term exposure to tetracyclines can result in nephrogenic diabetes insipidus which can be confirmed using a water deprivation test to asses the kidney's ability to concentrate urine.

Explanation

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This patient's clinical history suggests nephrogenic <u>diabetes insipidus</u>, related to long term exposure to tetracycline based antibiotics. A water deprivation test is likely to show low urine osmolality and elevated serum osmolality, with no significant response to desmopressin.

Whilst his glucose suggests there may be a degree of impaired fasting glucose, this is not enough to account for his symptoms.

There is no reason from the history to indicate that hypercalcaemia is the underlying reason for his symptoms. The clinical history and sodium and potassium within the normal range do not suggest a diagnosis of adrenal insufficiency.

As there is an obvious pharmacological cause for nephrogenic DI, there is no immediate reason to ultrasound the abdomen looking for underlying pathology. Ultrasound abdomen would only be useful if underlying renal or adrenal pathology was suspected.

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Question 119 of 121

☆ High impact question

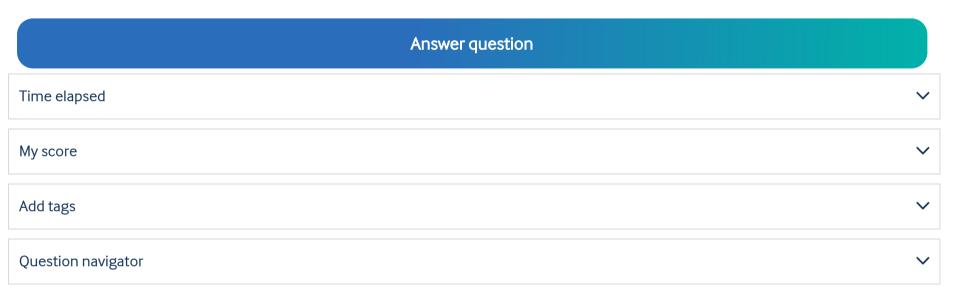
A 39-year-old man comes to the endocrine clinic after his second episode of acute pancreatitis. He was noted by the surgical registrar to have fasting triglycerides of 8.2 mmol/l (0.7-2.1) at his follow up appointment although his LDL level is not particularly raised.

On examination he has a BP of 125/70 mmHg, his pulse is 70 and regular and he has a BMI of 23. There is evidence of eruptive xanthomas on examination of his skin.

Which of the following is the most appropriate therapy for him?

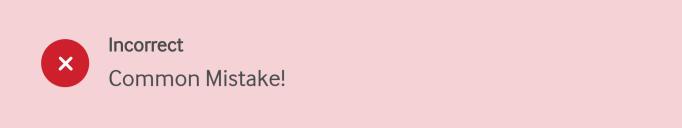
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- Simvastatin
- Omega-3 fatty acids
- Fenofibrate
- Atorvastatin



BMJ On Exam

English French



★ High impact question

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Which of the following is the most appropriate therapy for him?



Key learning points 🛭

Endocrinology

• Fibrates are the primary medication for treatment of isolated hypertriglyceridaemia.

Explanation

Fibrates are the primary medication for treatment of isolated hypertriglyceridaemia. They lower triglyceride levels by 30% or more on average, and this is thought to impact positively on future risk of pancreatitis.

Effects on cardiovascular outcomes in the FIELD study in type 2 diabetes have however been disappointing.

Omega-3 fatty acids lower triglycerides when used at very high dose; they and nicotinic acid may have a role in the treatment of patients who also have low high-density lipoprotein (HDL), those with metabolic syndrome features rather than familial hypertriglyceridaemia.

Atorvastatin at high dose is known to lower triglycerides but use is more usual in patients who also have raised low-density lipoprotein (LDL).

Simvastatin even at high dose has very modest effects on triglycerides.

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Question 120 of 121

★ High impact question

A 38-year-old man is referred with diarrhoea, dyspnoea and weight loss of approximately six months duration. Prior to this he had been quite fit and active.

The patient is aware of up to 10 episodes of diarrhoea daily. It also transpires that he frequently has flushes during the day which may occur at any time and during these episodes he is frequently wheezy and breathless. During the consultation it is noted that his face goes particularly red.

Examination reveals a pulse of 90 beats per minute regular, a blood pressure of 122/76 mmHg and saturations of 98% on air. His jugular venous pressure is elevated approximately 8 cm above the sternal angle and auscultation of the heart reveals a soft pan-systolic murmur at the left sternal edge. He is noted to have 8 cm hepatomegaly on abdominal examination.

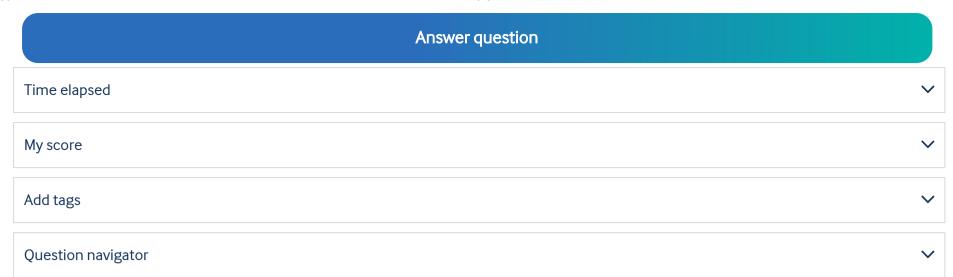
Investigations at this stage reveal:

Haemoglobin	149 g/L	(130-180)
White cell count	9.1 ×10 ⁹ /L	(4-11)
Platelets	310 ×10 ⁹ /L	(150-400)
Serum sodium	137 mmol/L	(137-144)
Serum potassium	3.9 mmol/L	(3.5-4.9)
Serum urea	7.1 mmol/L	(2.5-7.5)
Serum creatinine	87 μmol/L	(60-110)
Serum glucose	4.0 mmol/L	(3.0-6.0)
Serum bilirubin	17 μmol/L	(1-22)
Serum ALP	720 U/L	(45-105)
Serum AST	50 U/L	(1-31)
Serum ALT	62 U/L	(5-35)
24hr Urine HIAA	750 U/L	(<250)

Echocardiography reveals marked tricuspid regurgitation and mild pulmonary stenosis.

Which of the following is the most appropriate initial treatment for this patient?

- Surgical removal of primary lesion and hepatic debulking
 5-Fluorouracil
 Cyproheptadine
 Somatostatin therapy
- Hepatic artery embolistion



BMJ On Exam

English French



☆ High impact question

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Serum urea	7.1 mmol/L	(2.5-7.5)
Serum creatinine	87 μmol/L	(60-110)
Serum glucose	4.0 mmol/L	(3.0-6.0)
Serum bilirubin	17 μmol/L	(1-22)
Serum ALP	720 U/L	(45-105)
Serum AST	50 U/L	(1-31)
Serum ALT	62 U/L	(5-35)
24hr Urine HIAA	750 U/L	(<250)

Echocardiography reveals marked tricuspid regurgitation and mild pulmonary stenosis.

Which of the following is the most appropriate initial treatment for this patient?

Surgical removal of primary lesion and hepatic debulking	10%
5-Fluorouracil	■ 3%
Cyproheptadine	7 %



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology, Oncology

• Neuroendocrine tumours usually respond well to somatostatin analogues

Explanation

This patient has carcinoid syndrome.

This is a neuroendocrine tumour with generally a reasonable prognosis despite widespread dissemination.

The tumours usually express somatostatin receptors and good therapeutic response is usually seen following somatostatin analogue therapy (for example, octreotide).

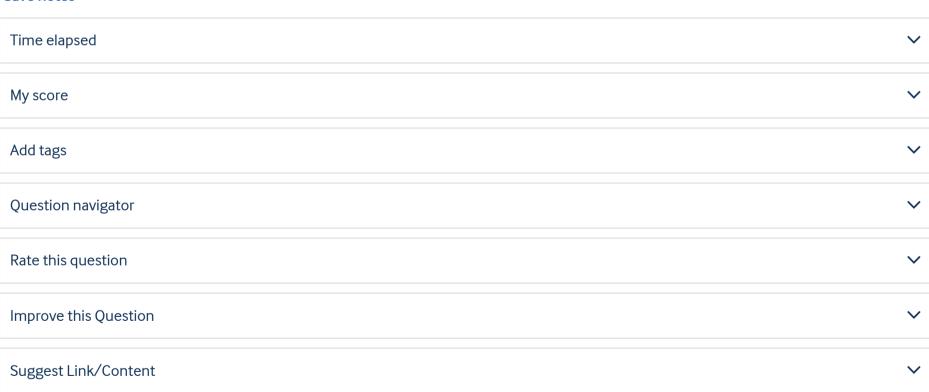
Standard chemotherapy has been shown to be ineffective. The patient is first treated with octreotide prior to hepatic artery embolisation.

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English French

Question 121 of 121

These thyroid function tests were obtained from a 65-year-old male who presents with tiredness.

Past history includes ischaemic heart disease and depression, for which he takes medication.

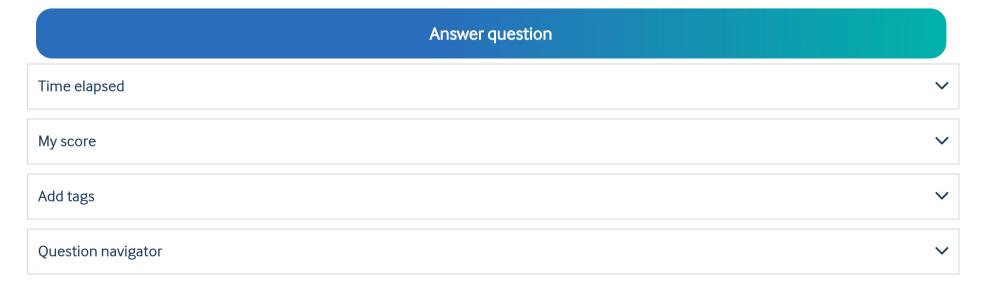
Free T4 25.7 pmol/L (10-22)

Free T3 3.1 pmol/L (5-10)

TSH 6.8 mU/L (0.4-5)

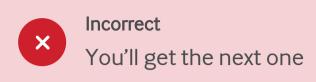
Which of the following is the most likely explanation for these results?

- Sick euthyroid syndrome
- Amiodarone therapy
- Lithium therapy
- Hashitoxicosis
- O Subclinical hyperthyroidism



BMJ On Exam

English French



These thyroid function tests were obtained from a 65-year-old male who presents with tiredness.

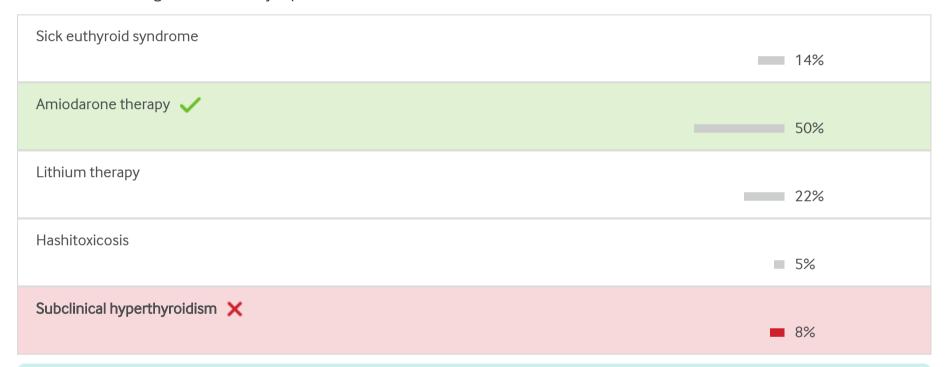
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TSH $6.8 \,\text{mU/L}$ (0.4-5)

Which of the following is the most likely explanation for these results?



Key learning points 🛭

Endocrinology, Therapeutics

• Amiodarone inhibits peripheral conversion of T4 to T3.

Explanation

Bizarre thyroid function tests (TFTs) seem to feature at the MRCP exam and amiodarone is usually the cause.

This is typical of amiodarone which inhibits the peripheral conversion of thyroxine (T4) to tri-iodothyronine (T3) so consequently T4 may be elevated and T3 low.

As T3 is the most active thyroid hormone the low T3 feedbacks at the pituitary level result in increased TSH secretion.

Lithium would typically cause low T4 and elevated thyroid-stimulating hormone (TSH).

Sick euthyroidism has variable TFTs but usually occurs in ill patients.

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BMJ On Exam

English French

Question 1 of 100

☆ High impact question

A 25-year-old male is referred with hypertension, agitation and sweats of approximately six months duration.

He has no specific family history of note, smokes 10 cigarettes per day and drinks little alcohol. Medication prescribed by his GP for hypertension includes bendroflumethiazide 2.5 mg/d and ramipril 10 mg per day. His blood pressure on examination was 176/94 mmHg and he has a BMI of 23.5 kg/m^2 .

Further investigations showed:

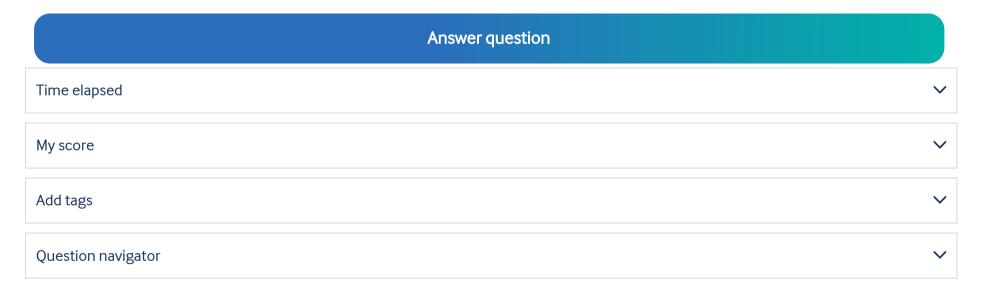
Urine free metadrenaline $12 \mu mol/24 hr$ (<5)

Fasting plasma calcitonin 100 ng/L (0-11.5)

MRI scan of the abdomen revealed a 3.5 cm mass in the right adrenal gland.

Based upon this information, what other diagnosis is likely to be associated with his condition?

- Gastrinoma
- Hyperparathyroidism
- Insulinoma
- Acoustic neuroma
- Prolactinoma



BMJ On Exam

English French



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Key learning points 🛭

Endocrinology, Genetics, Oncology

• MEN2 - phaeochromocytoma, medullary thyroid cancer and parathyroid adenoma.

Explanation

This patient has features of multiple endocrine neoplasia (MEN) type 2 suggested by phaeochromocytoma and medullary cell thyroid neoplasia and is associated with hyperparathyroidism.

MEN type 1 is associated with pancreatic and pituitary neoplasia.

MEN type 2 is usually autosomal dominant but in this patient's case there appears to be a spontaneous mutation as there is no family history of note.

It is important to investigate <u>phaeochromocytoma</u> in the young for potential precipitating disorders such as neurofibromatosis, MEN and von Hippel-Lindau.

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English French

Question 2 of 100

☆ High impact question

A 56-year-old woman is referred to the endocrine clinic with lethargy, weight gain and hair loss. Her problems have become worse over the past three to six months.

Past history of note includes hypertension for which she takes indapamide. On examination her pulse is 66 and regular and BP is 152/88 mmHg. Her BMI is 31. She has obvious generalised thinning of her hair.

Investigations show:

Haemoglobin	117 g/L	(115-160)
White cell count	7.0 ×10 ⁹ /L	(4-11)
Platelets	186 ×10 ⁹ /L	(150-400)
Sodium	136 mmol/L	(135-146)
Potassium	4.0 mmol/L	(3.5-5)
Creatinine	100 μmol/L	(79-118)
TSH	9.8 IU	(0.5-5)

Which of the following lipid abnormalities would you most expect to find?

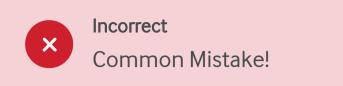
- Increased triglyceridesIncreased HDL
- O Increased large LDL particles
- Low overall LDL
- O Decreased IDL

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☆ High impact question

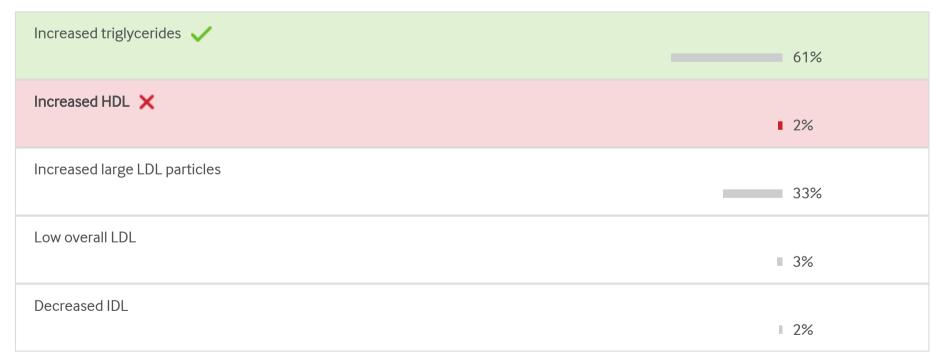
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TSH	9.8 IU	(0.5-5)

Which of the following lipid abnormalities would you most expect to find?



Endocrinology

• Hypothyroidism is associated with mixed dyslipidaemia, hence increased triglycerides is the most appropriate answer. Low HDL and a small increase in LDL are also seen.

Explanation

The predominant picture in hypothyroidism is mixed dyslipidaemia so the only possible correct answer is increased triglycerides.

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Increased high density lipoprotein (HDL) is seen with exercise and modest alcohol consumption.

Increased large buoyant low density lipoprotein (LDL) is seen in response to increased insulin sensitivity. It is thought to be less atherogenic than small dense LDL.

In hypothyroidism absolute levels of LDL are increased, a small increase in intermediate density lipoprotein (IDL) may be seen.

Next question

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BMJ On Exam

English French Question 3 of 100 A 50-year-old man has blood tests as follows: LH 1 U/L 1.3-8.4 <1 U/L FSH 2.9-8.4 Testosterone 7.5 nmol/L 10-28 What is the likely diagnosis? \bigcirc Untreated prostate cancer Hyperthyroidism \bigcirc \bigcirc Primary testicular failure \bigcirc Old age \bigcirc Hypopituitarism Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



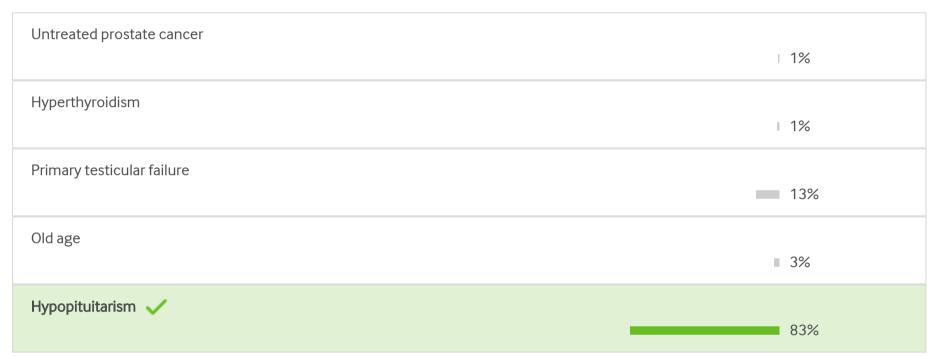
A 50-year-old man has blood tests as follows:

LH 1 U/L 1.3-8.4

FSH <1 U/L 2.9-8.4

Testosterone 7.5 nmol/L 10-28

What is the likely diagnosis?



Key learning points 🛭

Endocrinology

• Gonadotrophins; hormonal problems with gonads.

Explanation

In ageing and primary testicular failure, luteinising hormone (LH) and follicle-stimulating hormone (FSH) are elevated and testosterone is low.

With men, gonadal failure occurs typically more slowly than in women at the menopause. Thus a 50-year-old man would not necessarily be expected to show a picture of gonadal failure.

Untreated <u>prostate cancer</u> would be unlikely to cause this pattern at diagnosis. However, many men are treated with gonadotrophin antagonists which can cause a similar pattern to hypopituitarism.

Next question

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Question 4 of 100

☆ High impact question

A 62-year-old woman is referred to you with persistent hypertension and obesity.

She also complains of excessive pigmentation and headaches.

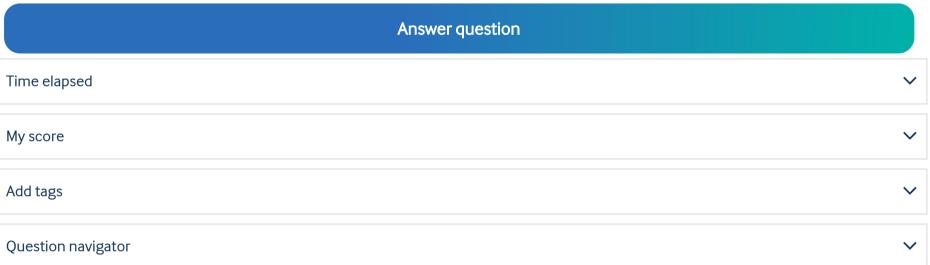
Her past medical history includes investigation in the 1970s for obesity, mild diabetes mellitus and hypertension.

At that time, she had a bilateral adrenalectomy which was then the treatment of choice for her condition. Since then, she has been on hydrocortisone and fludrocortisone treatment.

On examination, she is noted to have hyperpigmentation and striae. BP was 175/100 mmHg. No abnormality of the visual fields is noted.

What is the likely diagnosis in this case?

0	Acromegaly
\circ	Phaeochromocytoma
0	Addison's disease
0	Nelson's syndrome
\circ	Conn's syndrome

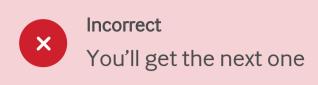


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☆ High impact question

A 62-year-old woman is referred to you with persistent hypertension and obesity.

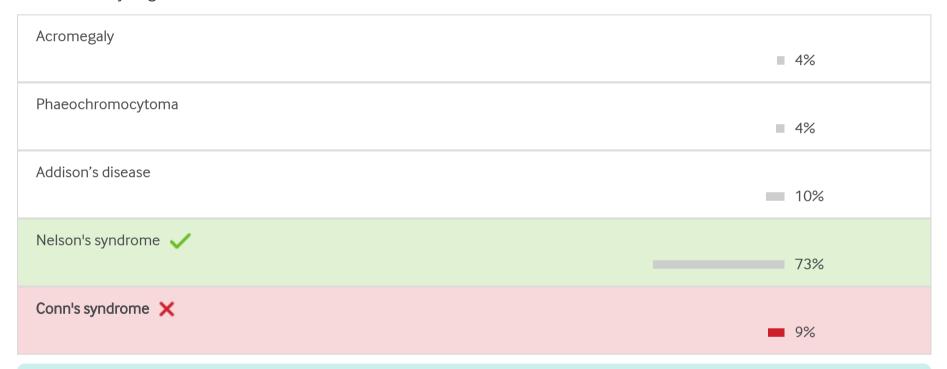
She also complains of excessive pigmentation and headaches.

Her past medical history includes investigation in the 1970s for obesity, mild diabetes mellitus and hypertension.

At that time, she had a bilateral adrenalectomy which was then the treatment of choice for her condition. Since then, she has been on hydrocortisone and fludrocortisone treatment.

On examination, she is noted to have hyperpigmentation and striae. BP was 175/100 mmHg. No abnormality of the visual fields is noted.

What is the likely diagnosis in this case?



Endocrinology

• Nelson's syndrome occurs in 30% of patients who undergo adrenalectomy for Cushing's disease

Explanation

Nelson's syndrome occurs in approximately 30% of patients adrenalectomised for Cushing's disease.

It is probably due to the clinical progression of the pre-existing <u>pituitary adenoma</u> after the restraint of hypercortisolism on adrenocorticotropic hormone (ACTH) secretion is removed.

Plasma ACTH levels are markedly elevated.

Pituitary magnetic resonance imaging (MRI) defines the extent of the tumour.

Next question

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Question 5 of 100

This 55-year-old female is referred with hypertension.



She has been hypertensive for over four years and control has been difficult despite a combination of atenolol 50 mg daily, lisinopril 20 mg daily and bendroflumethiazide 2.5 mg daily.

Examination reveals the appearance as shown with a blood pressure of 180/98 mmHg and a pulse of 66 beats per minute.

Which of the following investigations would be most appropriate?

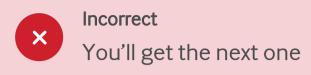
- O Urine catecholamine concentrations
- Oral glucose tolerance test and GH
- O Random growth hormone concentration
- O Insulin-like growth factor-1
- O Renal ultrasound examination

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9/10/24, 10:12 AM **BMJ OnExamination Assessment**

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Examination reveals the appearance as shown with a blood pressure of 180/98 mmHg and a pulse of 66 beats per minute.

Which of the following investigations would be most appropriate?





Endocrinology, Photographic

• Abnormal GTT with GH measurement is diagnostic of acromegaly.

Explanation

This patient appears acromegalic and hypertension may be a presenting feature.

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The most appropriate investigation would be an oral glucose tolerance test with growth hormone (GH) measurements.

Suppression of growth hormone concentrations below 2 mU/I would be expected in normal patients with non-suppression or paradoxical elevation seen in acromegaly.

Elevated IGF-1 concentrations would be expected but this is not diagnostic.

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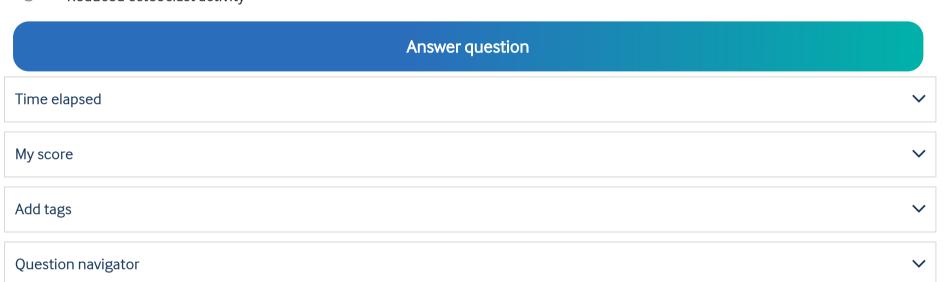
Question 6 of 100

☆ High impact question

A 67-year-old woman with severe osteoporosis, (T score -4.0 at the femoral neck) has failed to tolerate bisphosphonate therapy and wants to try teriparatide therapy as an injectable alternative.

Which of the following correctly represents an aspect of the mode of action for teriparatide?

- O Reduced calcium absorption from the gut
- Increased osteoblast activity
- O Increased calcium excretion from the kidney
- Reduced osteoblast activity
- Reduced osteoclast activity

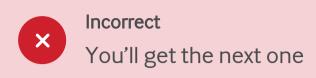


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English French



★ High impact question

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Which of the following correctly represents an aspect of the mode of action for teriparatide?



Key learning points 🛛



Endocrinology

• Teriparatide is the 1-34 active fragment of human parathyroid hormone used in osteoporosis when bisphosphonate therapy is not tolerated and works by osteoblast activation.

Explanation

Teriparatide is the 1-34 active fragment of human parathyroid hormone with a half life of approximately one hour. This is thought to lead to increased osteoblast activity, increased calcium absorption from the gut and reduced calcium excretion from the kidney.

Teriparatide leads to reduced calcium excretion and increased calcium absorption from the gut.

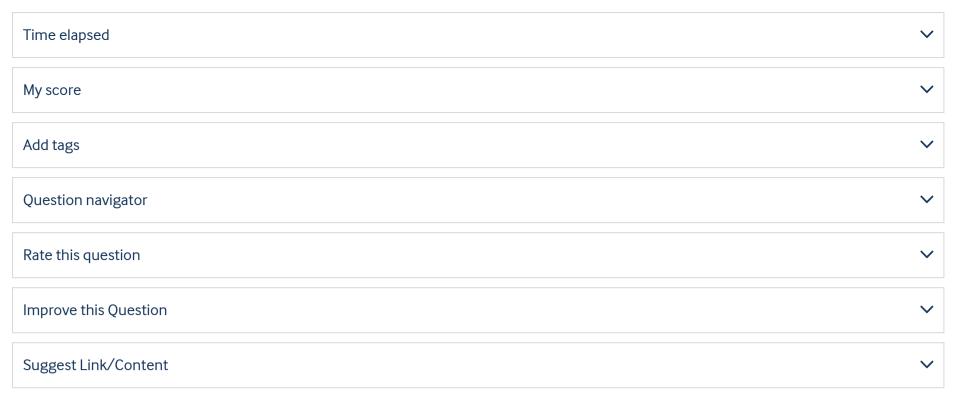
Its main effect is on osteoblast activity, not on osteoclast activity, so from the options given only increased osteoblast activity can be correct.

Next question

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Question 7 of 100

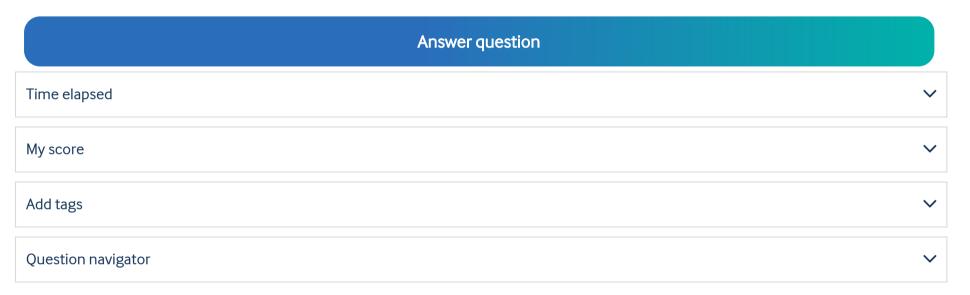
☆ High impact question

A 27-year-old female is referred by her GP, being 10 weeks pregnant. Three months ago she was diagnosed with thyrotoxicosis with an elevated T4 concentration and suppressed TSH concentration. At that stage her GP started her on carbimazole.

At presentation she has a pulse of 90 beats per minute, a fine tremor and lid lag. Blood pressure is 118/80 mmHg and she has a palpable goitre.

From the following, select the most appropriate treatment for this patient.

- O Continue carbimazole
- Thyroidectomy
- Switch to propylthiouracil
- Stop all drugs during pregnancy
- Radioactive iodine



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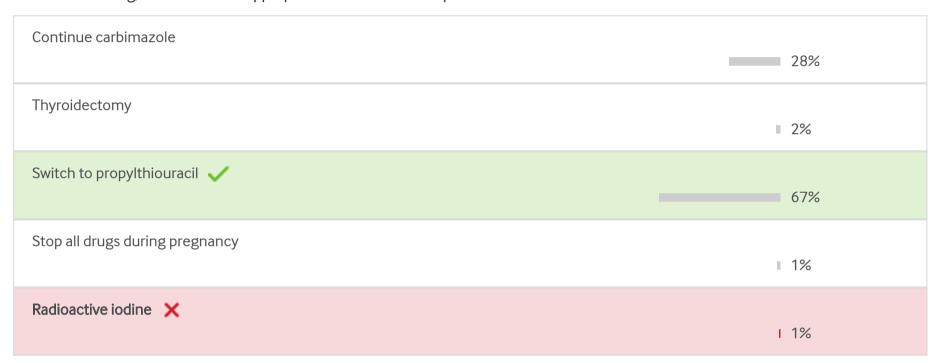


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At presentation she has a pulse of 90 beats per minute, a fine tremor and lid lag. Blood pressure is 118/80 mmHg and she has a palpable goitre.

From the following, select the most appropriate treatment for this patient.



Key learning points 🛭

Endocrinology

• PTU is recommended in the first trimester and then carbimazole thereafter

Explanation

This patient has thyrotoxicosis and is now pregnant. Thyrotoxicosis is itself associated with poor pregnancy outcome with intrauterine growth retardation (IUGR) and miscarriage. Therefore thyrotoxicosis needs to be treated during pregnancy with anti-thyroid medication.

The patient should be rendered euthyroid and then this should be maintained on the lowest dose of anti-thyroid medication to maintain euthyroidism.

A block and replacement regime is contraindicated as both carbimazole and propylthiouracil cross the placenta far better than thyroxine and so may induce fetal hypothyroidism. In the past, PTU was considered the drug of choice throughout pregnancy for women with hyperthyroidism, because of concerns about the possible teratogenic effects of carbimazole.

However, reports of severe PTU-related liver failure have now raised concerns about the routine use of PTU, including the use of PTU in pregnancy. Carbimazole has also been associated with liver disease, but it is typically due to cholestatic dysfunction, not hepatocellular inflammation. It was once considered that carbimazole induced aplasia cutis in the fetus but this has more recently been disputed as aplasia cutis may be an effect of thyrotoxicosis, rather than a side effect of carbimazole.

Consequently, for pregnant women with hyperthyroidism, we suggest that PTU use be limited to the first trimester only. Although the teratogenic effects of carbimazole are not well proven, they are potentially serious and are likely confined to the first trimester during organogenesis. After the first trimester, the potential risk of PTU-associated hepatotoxicity, although extremely rare, is

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BMJ OnExamination Assessment thought to outweigh any potential risks of carbimazole. Women who are taking carbimazole and learn they are pregnant should be

In the second trimester, we suggest switching from PTU to an equivalent dose of carbmizole. Thyroid function testing should be performed two to four weeks after switching to carbimazole to be sure that a euthyroid state has been maintained.

Subsequent monitoring of thyroid function should be performed every four weeks. Extra caution is necessary after switching from

PTU to carbimazole to avoid maternal overtreatment and fetal hypothyroidism

Radioactive iodine is absolutely contraindicated in pregnancy.

switched to PTU at the time of the positive pregnancy test.

Any surgery should be reserved for the last resort in pregnancy, as it is associated with increased risk of miscarriage.

The pregnancy can progress without problems if the thyrotoxicosis is adequately treated.

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Question 8 of 100

☆ High impact question

A 21-year-old woman comes to the endocrine clinic for review.

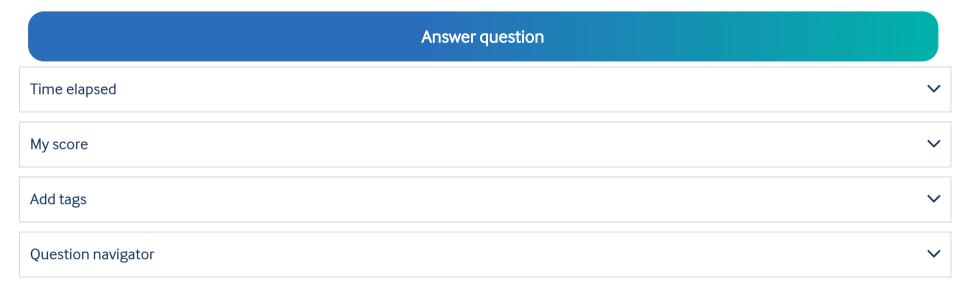
She has a history of hypertension which is managed with a combination of ramipril and indapamide. Her past medical history includes 11-beta hydroxylase deficiency diagnosed shortly after birth when cliteromegaly was identified by the midwives.

Which of the following is likely to be markedly raised?

\circ	Oestrone
\bigcirc	17-OH pregnenolone
\bigcirc	11-Deoxycortisol

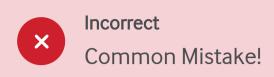
17-OH progesterone





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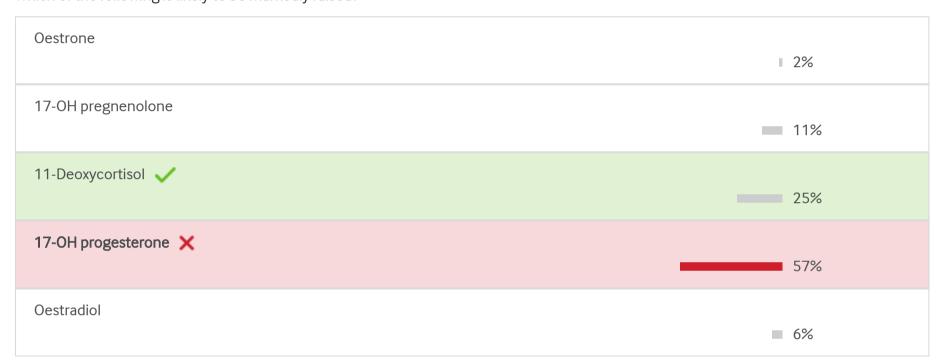


☆ High impact question

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She has a history of hypertension which is managed with a combination of ramipril and indapamide. Her past medical history includes 11-beta hydroxylase deficiency diagnosed shortly after birth when cliteromegaly was identified by the midwives.

Which of the following is likely to be markedly raised?



Key learning points 🛭

Endocrinology

• 11 Beta-hydroxylase is responsible for conversion of 11-deoxycorticosterone and 11-deoxycortisol to corticosterone and cortisol.

Explanation

11 Beta-hydroxylase is responsible for conversion of 11-deoxycorticosterone and 11-deoxycortisol to corticosterone and cortisol. As this enzyme is not active in patients with 11-beta hydroxylase deficiency, levels of these steroids accumulate in patients suffering from the disorder.

Whilst levels of 17-OH steroids are elevated in those with 11-beta hydroxylase deficiency, the elevation seen is not as great as that seen with 21-hydroxylase deficiency, occasionally an incorrect diagnosis of 21-hydroxylase deficiency may however be made.

Oestrogens are synthesised by aromatase conversion of androgens, and as such levels are not markedly elevated.

Next question

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Question 9 of 100

A 48-year-old male is seen at the diabetic clinic for annual review.

He has a four year history of diabetes and mild hypertension for which he takes gliclazide 160 mg bd, metformin 500 mg bd, rosuvastatin 10 mg od and bendroflumethiazide 2.5 mg daily. At the consultation he is generally untroubled except for impotence which has deteriorated over the last 12 months. He has tried Viagra but without success. He is becoming increasingly distressed about his impotence although he has an understanding wife. You specifically ask him about joint pains and he reports no history of these.

On examination he has a BMI of 29 kg/m^2 , a blood pressure of 134/78 mmHg, a pulse of 90 bpm and appears well with normal skin tone and colour. There is no evidence of neuropathy or retinopathy and all pulses are palpable.

His investigations reveal:

HbA _{1c}	63 mmol/mol	(20-46)
	7.9%	(3.8-6.4)
Fasting plasma glucose	9 mmol/L	(3.0-6.0)
Total cholesterol	4 mmol/L	(<2.5)
Serum testosterone	6.5 nmol/L	(9-35)
Plasma lutenising hormone	0.5 mU/L	(1-10)
Plasma follicle stimulating hormone	0.9 mU/L	(1-7)
Plasma prolactin	322 mU/L	(<360)

Which of the following investigations would you request next for this patient?

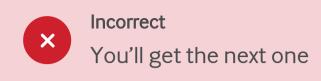
- Thyroid function tests
- Ultrasound testes
- MRI pituitary
- Karyotype
- Short Synacthen test

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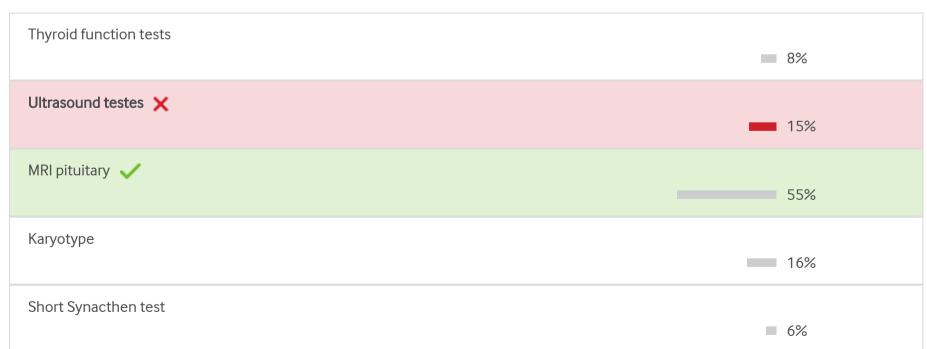
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Plasma follicle stimulating hormone	0.9 mU/L	(1-7)
Plasma prolactin	322 mU/L	(<360)

Which of the following investigations would you request next for this patient?



Diabetes, Endocrinology

• Hypogonadotrophic hypogonadism (low testosterone with inappropriately low or normal LH & FSH) requires pituitary investigation primarily.

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Explanation

This man with diabetes has hypogonadotrophic hypogonadism as reflected by a low testosterone and low luteinising hormone (LH)/follicle-stimulating hormone (FSH).

The suggestion therefore is that pituitary disease has to be ruled out as the cause of the hypogonadism. The lack of evidence of increased skin pigmentation and chondrocalcinosis counts against haemochromatosis.

An ultrasound of the testes is unnecessary as this is secondary hypogonadism and is not due to a testicular problem (that is, primary hypogonadism).

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English French

Question 10 of 100

A 54-year-old female presented with a neck swelling which has been more noticeable over the previous four months.

Examination revealed a moderate goitre and clinically she appeared euthyroid.

Investigations revealed:

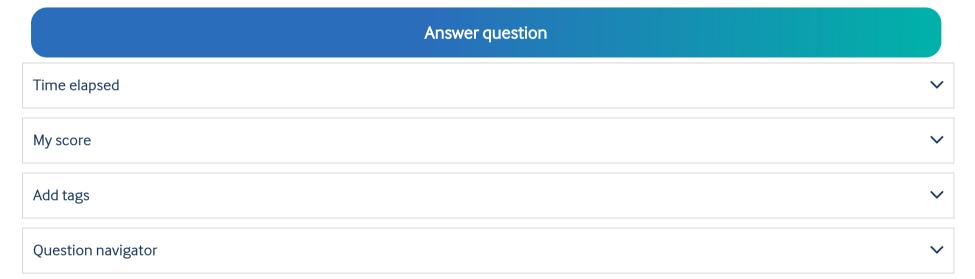
T4 13.1 pmol/L (10-22)

TSH 5.3 mU/L (0.4-5)

Anti-microsomal antibodies Positive

What is the most likely explanation of this patient's goitre?

- O Graves' disease
- Multi-nodular goitre
- O DeQuervain's thyroiditis
- O Hashimoto's thyroiditis
- Anaplastic thyroid carcinoma



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A 54-year-old female presented with a neck swelling which has been more noticeable over the previous four months.

Examination revealed a moderate goitre and clinically she appeared euthyroid.

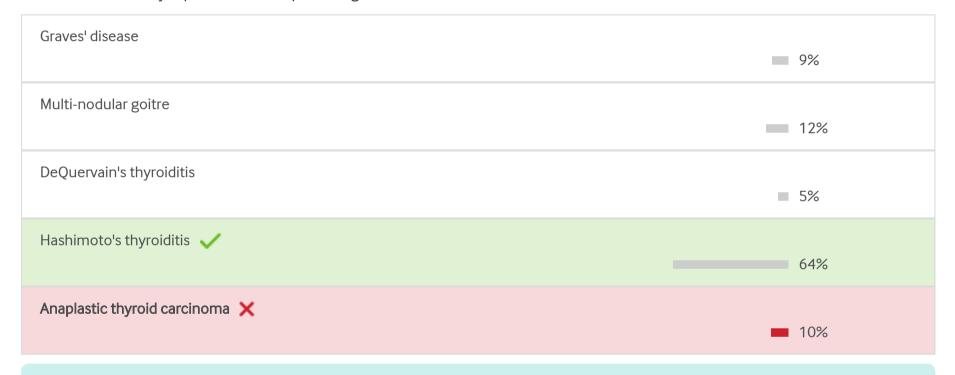
Investigations revealed:

T4 13.1 pmol/L (10-22)

TSH 5.3 mU/L (0.4-5)

Anti-microsomal antibodies Positive

What is the most likely explanation of this patient's goitre?



Key learning points 🛭



Endocrinology

• Hashimoto's disease is associated with positive anti-TPO (or microsomal) antibodies.

Explanation

This patient has goitre with subclinical hypothyroidism, as reflected by elevated thyroid-stimulating hormone but normal thyroxine and elevated microsomal antibodies (aka anti TPO antibodies).

This suggests a diagnosis of <u>Hashimoto's thyroiditis</u>.

Next question

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9/10/24, 10:22 AM BMJ OnExamination Assessment

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English French

Question 11 of 100

A 77-year-old lady was referred to outpatients by her GP.

The GP's note stated that the patient had a fracture of her femoral neck while she was walking three months previously. The fracture had been treated with a dynamic hip screw. The patient wanted some form of treatment that would 'strengthen her bones and prevent other fractures'.

She had no other medical history of note, except that she had a hysterectomy and bilateral oophorectomy aged 45 for severe menorrhagia. Physical examination was unremarkable.

What is the best treatment option for this patient?

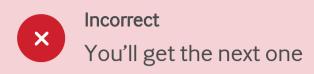
\circ	Calcitonin
\bigcirc	Dual energy x ray absorptiometry (DEXA) scanning
\bigcirc	Raloxifene
\bigcirc	Alendronate
\bigcirc	Teriparatide

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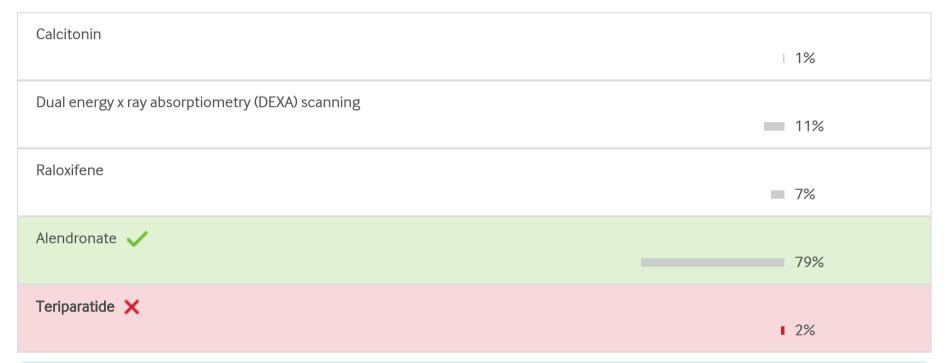


A 77-year-old lady was referred to outpatients by her GP.

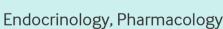
The GP's note stated that the patient had a fracture of her femoral neck while she was walking three months previously. The fracture had been treated with a dynamic hip screw. The patient wanted some form of treatment that would 'strengthen her bones and prevent other fractures'.

She had no other medical history of note, except that she had a hysterectomy and bilateral oophorectomy aged 45 for severe menorrhagia. Physical examination was unremarkable.

What is the best treatment option for this patient?



Key learning points 💡



• Females over the age of 75 who have a history of fragility fracture should be started on oral bisphosphonate therapy

Explanation

NICE guidelines on the secondary prevention of <u>osteoporosis</u> recommend that patients over 75 with a history of a fragility fracture should be started on bisphosphonates without the need of a prior DEXA scan.

Raloxifene and teriparatide are second line treatments if bisphosphonates are not tolerated, ineffective or unsuitable for the patient.

Reference:

NICE. Osteoporosis - secondary prevention including strontium ranelate (TA161)

Next question

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Question 12 of 100

A 55-year-old woman is found to have ++ glycosuria and had a maternal history of type 2 diabetes mellitus. She is a smoker of 20 cigarettes per day.

Examination reveals no specific abnormalities apart from a BMI of 30 kg/m². Blood pressure was 132/88 mmHg.

Investigations reveal:

Serum creatinine 80 µmol/L (60-110)

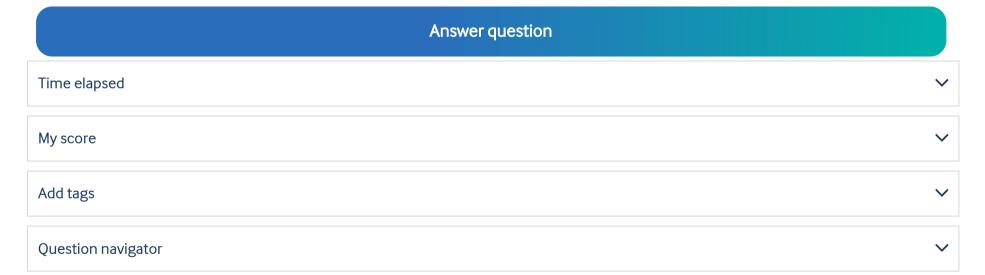
Plasma glucose (fasting) 11.3 mmol/L (3.0-6.0)

Total serum cholesterol 5.5 mmol/L (<5.2)

HDL cholesterol 1.4 mmol/L (>1.55)

What is most likely to improve her life expectancy?

- O Ramipril 10 mg daily
- O Simvastatin 10 mg daily
- O Metformin 500 mg twice daily
- O Weight loss to achieve a BMI of 25
- Stopping smoking



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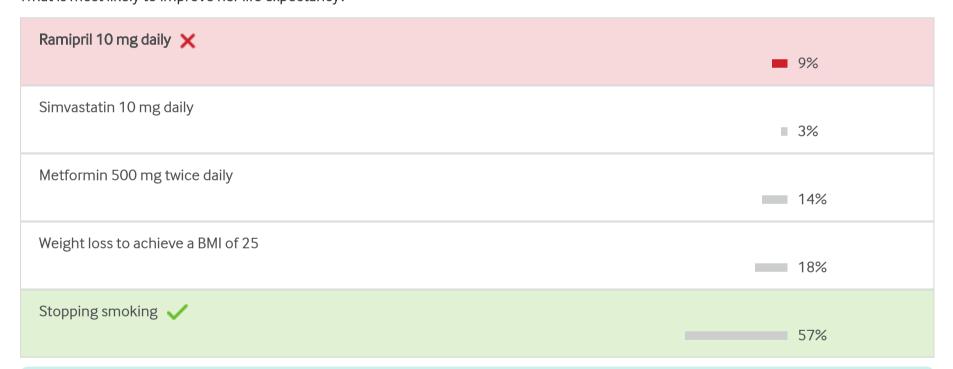
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Serum creatinine 80 μmol/L (60-110)Plasma glucose (fasting) (3.0-6.0)11.3 mmol/L Total serum cholesterol 5.5 mmol/L (<5.2) HDL cholesterol (>1.55)1.4 mmol/L

What is most likely to improve her life expectancy?





Cardiology, Diabetes, Therapeutics

• Smoking cessation will have greatest impact on CV risk in diabetic obese population

Explanation

She is diabetic and obese as defined by her BMI of 30 kg/m^2 .

She is most prone to risk of cardiovascular disease with evidence suggesting that people with diabetes have at least a two- to fourfold increased cardiovascular mortality.

In terms of improving life expectancy, of the risk factors mentioned, diabetes, mild dyslipidaemia and hypertension, stopping smoking would, without question, be expected to have the greatest benefit.

Tight glycaemic control unfortunately does little to reduce cardiovascular risk (United Kingdom prospective diabetes study [UKPDS]) and statin therapy would be expected to have a small but significant impact in this patient according to primary prevention studies (West of Scotland Coronary Prevention Study [WOSCOPS]).

Stopping smoking is the first priority, even if it causes further weight gain.

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BMJ OnExamination Assessment

Smoking is associated with a cardiovascular risk of six times in women and three times in men. Stopping smoking (after a myocardial infarction [MI]) reduces the risk of recurrent MI by 50%.

Reference:

Improve this Question

Suggest Link/Content

1. Njølstad I, et al. <u>Smoking, serum lipids, blood pressure, and sex differences in myocardial infarction. A 12-year follow-up of the Finnmark Study.</u> *Circulation.* 1996;93:450-6.

Next question

2. Prescott E, et al. <u>Smoking and risk of myocardial infarction in women and men: longitudinal population study.</u> *BMJ.* 1998;316:1043-7.

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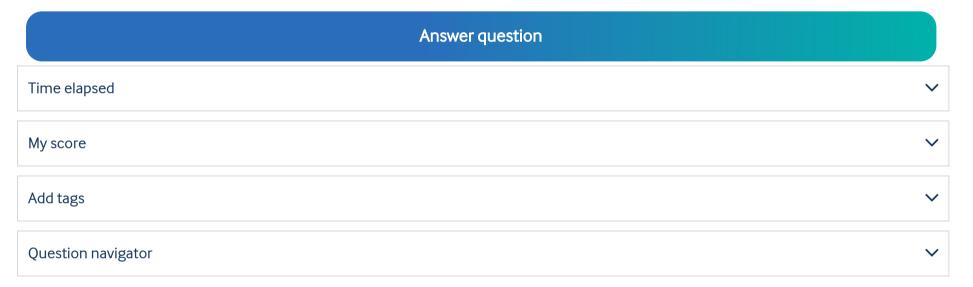
Question 13 of 100

An otherwise healthy 48-year-old woman with thyroid cancer undergoes a thyroidectomy lasting three hours.

The following day she complains of tingling in her hands and mouth before having a self terminating seizure. Her ECG shows sinus rhythm with a QTc interval of 510 ms.

Which of the following deranged investigations is most likely to account for her clinical presentation?

- O Glucose 2.1 mmol/L
- O Sodium 114 mmol/L
- O Calcium 1.9 mmol/L
- O PaO₂ 8.5 kPa (FiO₂ 0.4)
- O Potassium 2.1 mmol/L



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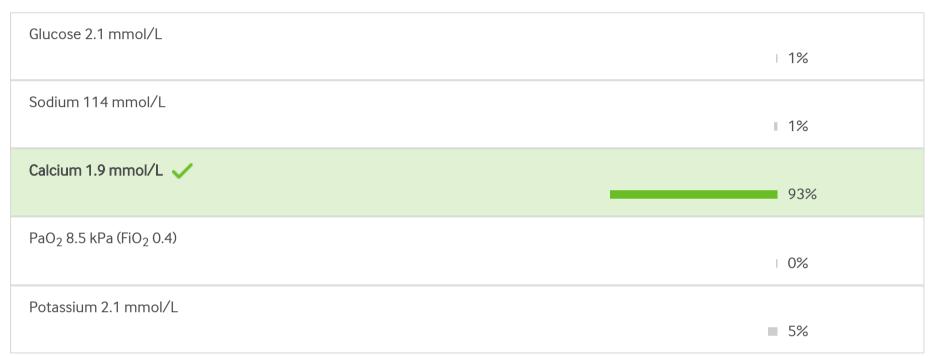
English French



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Which of the following deranged investigations is most likely to account for her clinical presentation?



Critical Care, Endocrinology, Thyroid

• Hypocalcaemia is an important complication of thyroid surgery, and you need to be able to recognise the clinical presentation of this condition.

Explanation

Temporary hypocalcaemia may affect up to 20% of patients after thyroidectomy as a result of trauma to the parathyroid glands or their inadvertent excision in theatre.

Acute hypocalcaemia usually presents 24-48 hours postoperatively and may present with perioral tingling, twitching or tetany. This may progress to seizures and ventricular arrhythmias. The ECG may show a prolonged QT interval (QTc is prolonged if >440 ms in men or >460 ms in women.) is associated with increased risk of torsades de pointes and treatment for serum calcium levels <2 mmol/L is urgent intravenous calcium (10 ml of 10% calcium gluconate) followed by an infusion if necessary.

Hypoglycaemia can, *in extremis*, cause a seizure but this would usually be preceded by neuroglycopenic symptoms such as altered mentation, lethargy as well as hunger and sweating which are absent in the patient. The patient is not diabetic.

Acute severe hyponatraemia is rare in an otherwise healthy patient. It is associated initially with abdominal symptoms, followed by neuropsychiatric symptoms not present in this case. Hyponatraemic patients complain of muscle weakness but not perioral tingling. Ventricular ectopics are not a characteristic feature of hyponatraemia.

Such a severe hypokalaemia in the absence of urinary or GI losses of potassium would be extremely rare in an otherwise healthy patient. In addition, hypokalaemia presents more commonly with skeletal muscle weakness and myalgia leading to flaccid paralysis in extremis. Although cardiac arrhythmias are a feature of hypokalaemia, perioral tingling is not common, and seizures are rare.

There is nothing in the clinical presentation that suggests the patient is hypoxic. Paraesthesia and ventricular ectopics are not features of hypoxia and a hypoxic seizure would be extremely unlikely at a PaO₂ of 8.5 kPa.

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9/10/24, 10:23 AM **BM.I OnExamination Assessment**

BMJ On Exam

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Question 14 of 100

★ High impact question

A 68-year-old man was admitted to the acute medical assessment unit with a one day history of epigastric pain. The pain had started suddenly as a sharp central abdominal ache but by the time of admission the pain was unremitting, severe and radiating through to his back. He had vomited several times.

There was no past history of other medical problems. On further questioning, he reported a history of headaches that had occurred intermittently for several years and of occasional feelings of low mood and low self esteem. He had lost approximately 4 kg in weight over the previous eight months. Over the past five or six months he had been getting up to pass urine several times at night.

He lived alone. Since his wife died six years previously he seldom left the house. He had a son and daughter who did not live locally. A neighbour did his weekly shopping and he also received 'Meals on Wheels'; he had a home-help visit him twice a week.

On examination he appeared unwell. He was pale and slow to respond to questions. His tongue and mucous membranes were dry and there was loss of skin turgor. His temperature was 37.5°C, pulse 130/minute and regular, BP 110/60 mmHg. Heart sounds were normal and chest was clear. On palpation of his abdomen there was marked central and epigastric tenderness with no guarding or rebound tenderness; there were no palpable organs; bowel sounds were absent. Rectal examination was unremarkable.

Urinalysis: glucose ++, protein +, ketones +

Investigations showed:

Hb	149 g/dL	(130-180)
WBC	14.1 ×10 ⁹ /L	(4-11)
Platelets	450 ×10 ⁹ /L	(150-400)
MCV	94 fL	(80-96)
Sodium	133 mmol/L	(137-144)
Potassium	3.9 mmol/L	(3.5-4.9)
Urea	18.1 mmol/L	(2.5-7.5)
Creatinine	177 μmol/L	(60-110)
Bicarbonate	19 mmol/L	(20-28)
Phosphate	0.7 mmol/L	(0.8-1.4)
Glucose	37.2 mmol/L	(3.0-6.0)
Albumin	24 g/L	(37-49)
Bilirubin	18 μmol/L	(1-22)
Alk phos	88 U/L	(45-105)
AST	23 IU/L	(1-31)

Which of the following would be the most useful investigation to establish the diagnosis?

 \bigcirc Plasma amylase

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Abdominal ultrasound scan

Blood cultures

Abdominal x ray

Upper Gl endoscopy

Answer question

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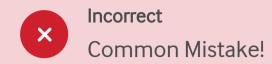
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English French



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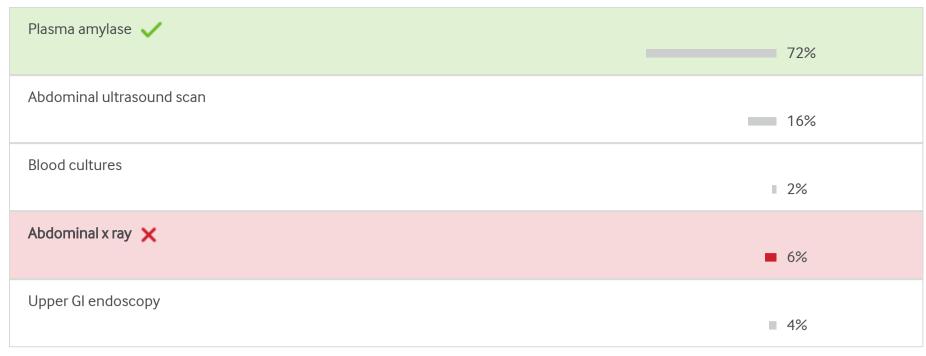
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Alk phos	88 U/L	(45-105)
AST	23 IU/L	(1-31)

Which of the following would be the most useful investigation to establish the diagnosis?

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Key learning points 🛭



Endocrinology, Gastroenterology

• Diagnosis of acute pancreatitis

Explanation

The patient has acute pancreatitis, of those listed a plasma amylase would be most helpful in establishing the diagnosis.

CT would be preferable to ultrasound in establishing the presence of inflammation (acute or chronic) of the pancreas and severity of disease if further diagnostic confirmation were necessary. Ultrasound is the most useful intial test in trying to determine the aetiology of an attack of acute pancreatitis.

Abdominal x ray has no role in the diagnosis of acute pancreatitis but may demonstrate calcification in the presence of chronic pancreatic inflammation. The raised white cell count is likely to be part of a systemic inflammatory response rather than an indicator of infection.

Upper GI endoscopy would not be of use in diagnosing acute pancreatitis and would not be indicated in this patient unless the plasma amylase or subsequent imaging failed to identify the cause of his presentation.

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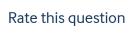




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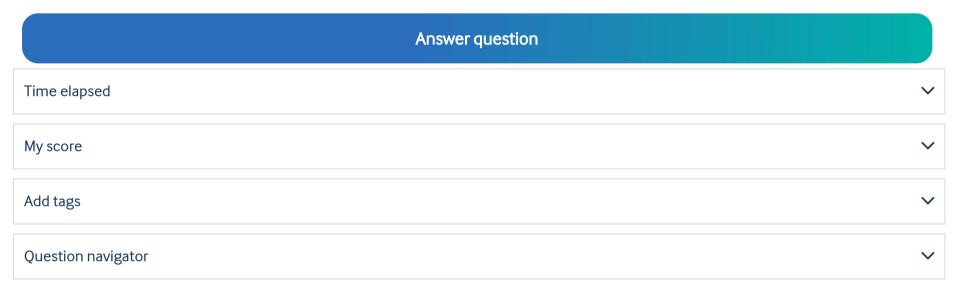
English French

Question 15 of 100

A 53-year-old woman with type 2 diabetes is initiated on insulin. She is currently taking metformin 1g BD and gliclazide 160 mg BD. An intermediate acting NPH insulin is to be started once a day at night.

Which of the following is the most appropriate advice to give with regards her oral diabetic drugs once the insulin is started?

- O Both the metformin and gliclazide should have their doses halved
- O Both the metformin and gliclazide should be stopped
- O The metformin should be stopped and the gliclazide can be continued
- O The gliclazide should be stopped and the metformin can be continued
- O Both the metformin and gliclazide can be continued

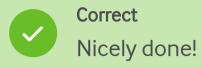


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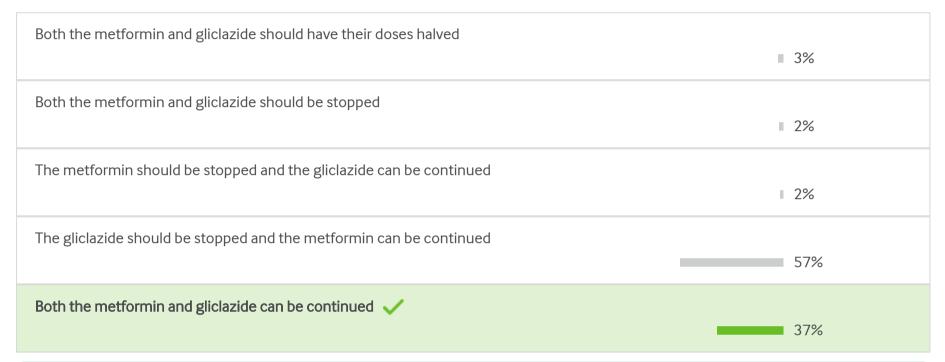
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Which of the following is the most appropriate advice to give with regards her oral diabetic drugs once the insulin is started?



Key learning points 🛭

Diabetes, Endocrinology

• Oral diabetic agents can generally be continued when insulin is started

Explanation

Metformin is widely used and continued alongside insulin as there is evidence that it is beneficial in reducing the amount of insulin needed, and also for its weight and cardiovascular benefits.

Sulphonylureas can also be continued with insulin. If the patient is taking a daily isophane or analogue insulin, it is continued at the same dose with monitoring. With other insulins/regimens the dose can be halved or the sulphonylurea discontinued if desired. Hypoglycaemia is the biggest fear when using a sulphonylurea with insulin so greater caution needs to be exercised in vulnerable patients (e.g. elderly, dementia, those who live alone).

DPP-4 inhibitors, pioglitazone, GLP-1 agonists, and SGLT-2 inhibitors all have drugs in their respective classes that can be continued alongside insulin.

Acarbose is not recommended in combination with insulin (although is rarely used these days).

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Question 16 of 100

A 60-year-old female was prescribed thyroxine 150 microgrammes daily for hypothyroidism.

She was clinically hypothyroid and no goitre was present.

She attends a follow up clinic and following are her results:

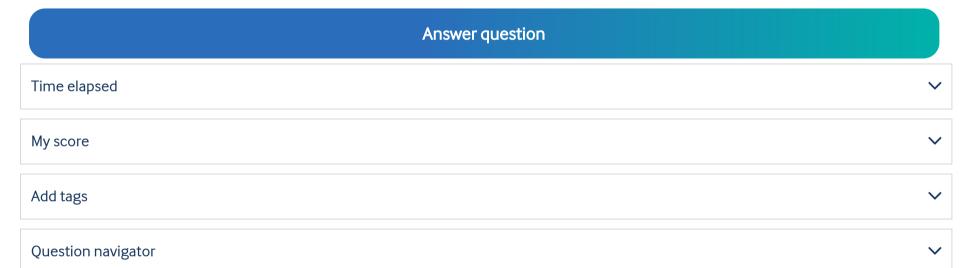
Serum total T4 68 nmol/L (55-145)

Serum total T3 0.5 nmol/L (0.9-2.5)

Serum TSH 70 mU/L (0.4-5)

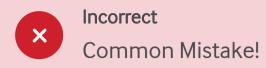
Which of the following would be the next step in her management?

- Measurement of free thyroxine concentration
- O She has sick euthyroid syndrome, no further investigation required
- O Thyroid ultrasound scan
- O Investigation for TSH secreting pituitary tumour
- O Questioning of the patient about compliance



BMJ On Exam

English French



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Serum TSH 70 mU/L (0.4-5)

Which of the following would be the next step in her management?

Measurement of free thyroxine concentration	12%
She has sick euthyroid syndrome, no further investigation required	□ 1%
Thyroid ultrasound scan 🗶	■ 1%
Investigation for TSH secreting pituitary tumour	6 %
Questioning of the patient about compliance 🗸	79%

Key learning points 🛭

Endocrinology

• With raised TSH and raised T4 in the presence of someone recently commenced on thyroid replacement for hypothyroidism consider compliance issues.

Explanation

Apart from by the RCP total thyroid hormone levels are now seldom measured.

This patient has a raised thyroid-stimulating hormone but normal total thyroxine (T4) and a low tri-iodothyronine (T3).

Either there is a block on the conversion of T4 to T3 or as seems more likely the patient has taken the T4 just prior to coming to clinic.

The explanation is non-compliance.

Next question

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BMJ On Exam

English French

Question 17 of 100

A 65-year-old man is brought to the Emergency Department having been found collapsed and semi-conscious at home; he is unable to give a coherent history and he has no family to assist.

On examination, his GCS is depressed at 10/15, his pupils are reactive, there are no localising neurological signs and cranial nerves are intact. He has a temperature of 38.5°C, is dehydrated, has a pulse rate of 125/min with a BP of 110/60 mmHg associated with a postural drop of approximately 10 mmHg.

On auscultation of his praecordium, heart sounds 1 and 2 are audible with no murmurs. He is tachypnoeic and hypoxic with O_2 sats of 89% on air and has right lower zone dullness to percussion with coarse breath sounds. His abdomen is soft with audible bowel sounds.

Ophthalmoscopy shows some microaneurysms and exudates. The Emergency Department nurse dipsticks the urine which is +++ Glucose and a finger blood glucose is greater than 40. Emergency blood gas results and other biochemistry are shown here.

Serum sodium	170 mmol/L	(137-144)
Serum potassium	4.9 mmol/L	(3.5-4.9)
Serum chloride	100 mmol/L	(95-107)
Serum bicarbonate	20 mmol/L	(20-28)
Serum urea	25.4 mmol/L	(2.5-7.5)
Serum creatinine	240 μmol/L	(60-110)
Serum amylase	120 mmol/L	(60-180)
Plasma glucose	45 mmol/L	(3.0-6.0)
HbA _{1c}	74 mmol/mol	(20-46)
	8.9%	(3.8-6.4)

Blood Gases anaylsis (on air):

рН	7.39	(7.36-7.44)
PaO ₂	8.0 kPa	(11.3-12.6)
PaCO ₂	4.2 kPa	(4.7-6.0)
Base excess	-4 mmol/L	(+/-2)
Plasma lactate	2.0 mmol/L	(0.6-1.8)

He has been given enough 0.9% saline to match the initial fluid deficit. However despite this the sodium remains high.

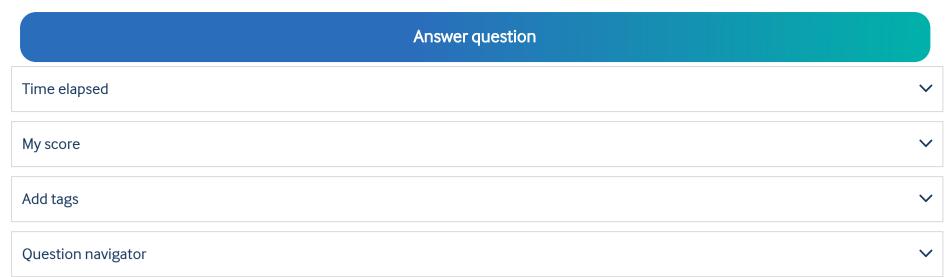
What is the correct choice of IV fluid treatment at this point?

\circ	0.45% saline
\bigcirc	Gelofusine
\circ	0.9% saline
\circ	Dextrose/saline

 \bigcirc

5% dextrose

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BMJ On Exam

English French



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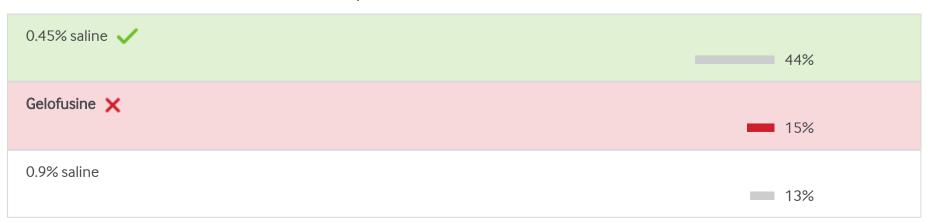
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	8.9%	(3.8-6.4)

Blood Gases anaylsis (on air):

pH 7.39 (7.36-7.44) PaO_2 8.0 kPa (11.3-12.6) $PaCO_2$ 4.2 kPa (4.7-6.0) Base excess -4 mmol/L (+/-2)Plasma lactate 2.0 mmol/L (0.6-1.8)

He has been given enough 0.9% saline to match the initial fluid deficit. However despite this the sodium remains high.

What is the correct choice of IV fluid treatment at this point?



Dextrose/saline	■ 6%
5% dextrose	22%

Key learning points 🛭

Endocrinology

• The initial management of HHS is with IV rehydration (and later addition os insulin if required)

Explanation

This patient has hyper-osmolar hyperglyacaemic coma (HHS) with calculated osmolality of 420 mOsm/kg [2(Na+K) + glucose + urea] and, in the absence of ketonuria, this is likely to have been precipitated by pneumonia. This state occurs in older type 2 diabetic patients, some residual insulin production preventing the development of ketoacidosis, which occurs in type 1 diabetic patients more commonly.

Consequent on the osmotic diuresis due to hyperglycaemia, the patient will be very dehydrated. The initial goal is repletion of extracellular volume; the 1 litre of saline will start to restore this, as it remains in the extracellular compartment; this is suggested by the mild hypotension and absent postural drop - if these were still persistent that would indicate a need for further volume expansion. Once this has been achieved in patients who are hyperosmolar - as is the case - given the hypernatraemia, the appropriate agent is 0.45% saline which replaces intra and extracellular fluid loss, which is similar in composition to the fluid lost during the osmotic diuresis.

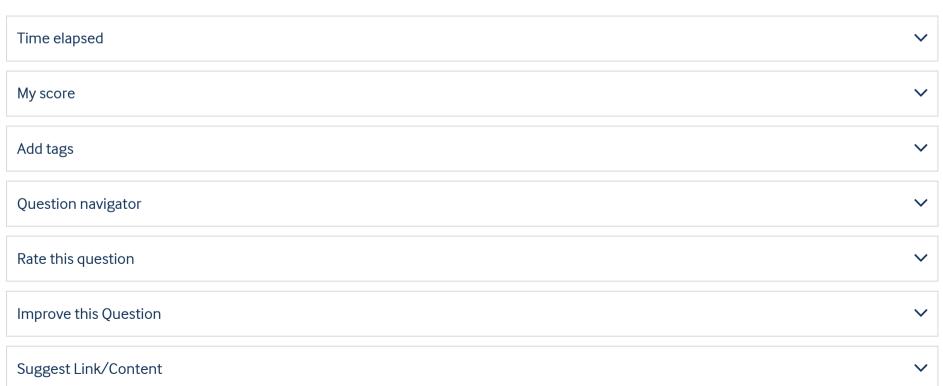
5% dextrose should be added when blood glucose reaches 15 mmol/L. Electrolytes should be checked 2-4 hourly, aiming a decrease of Na of no quicker than 10 mmol/day, and patients managed in a high care environment.

Next question

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English French

Question 18 of 100

The following results were obtained on dual energy x ray absorptiometry (DEXA) scan of the hip of a 57-year-old post-menopausal Asian female who was worried about osteoporosis, due to a strong family history.

	BMD	Tscore	Z score
Neck	0.75	-0.9 (88%)	+0.29 (105%)
Trochanteric	0.733	+0.38 (104%)	+1.1 (118%)
Intertrochanteric	0.901	-1.29 (82%)	-0.68 (89%)
Total	0.826	-0.95 (88%)	-0.11 (98%)
Ward's	0.490	-2.0 (67%)	-0.21 (95%)

What do the results show?

- Osteopetrosis
- O Normal bone mineral density
- Osteomalacia
- Osteoporosis
- Osteopenia

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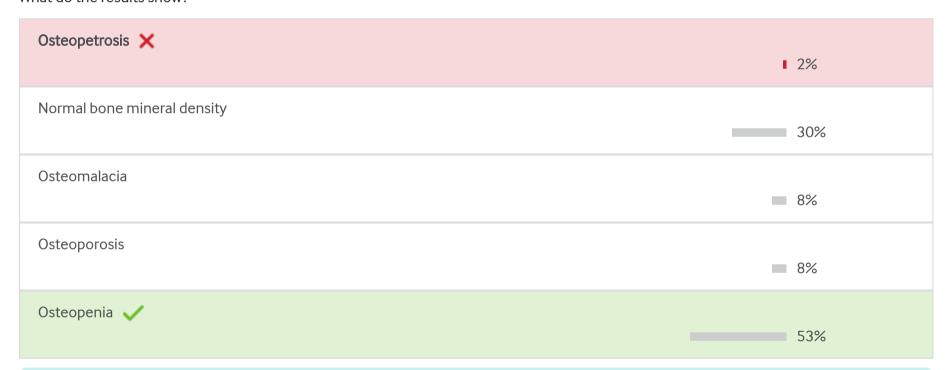
English French



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Total	0.826	-0.95 (88%)	-0.11 (98%)
Ward's	0.490	-2.0 (67%)	-0.21 (95%)

What do the results show?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology, Metabolism

• Osteopenia is T score -1 to -2.5

Explanation

A DEXA scan assesses bone mineral density (BMD) at various sites of the body usually hip and lumbar spine.

The T score is the SD between the patient's BMD and that of a young control and the Z score is the SD between the BMD of the patient and that expected for an aged and sex matched individual.

- T scores greater than -1 are normal
- $\bullet~$ T scores between –1 to –2.5 reflect osteopenia and
- T scores less than -2.5 reflect osteoporosis.

This DEXA report shows T scores between +0.38 and -2.0 at regions of the hip indicating osteopenia at Ward's triangle and intertrochanteric region.

Osteomalacia cannot be demonstrated on DEXA as this is a pathological/biochemical diagnosis.

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English French

Question 19 of 100

This 50-year-old male presents with a three month history of tiredness, lethargy and weight gain. Six years previously he underwent transsphenoidal resection of a non-functional pituitary tumour.

He currently takes hydrocortisone, thyroxine and testosterone therapy. Examination reveals the appearances as shown and a BMI of 30.



Which of the following treatments would you consider for this patient?

- O DHEAS
- O Growth hormone
- Fludrocortisone
- Orlistat
- Desmopressin

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This 50-year-old male presents with a three month history of tiredness, lethargy and weight gain. Six years previously he underwent transsphenoidal resection of a non-functional pituitary tumour.

He currently takes hydrocortisone, thyroxine and testosterone therapy. Examination reveals the appearances as shown and a BMI of 30.



Which of the following treatments would you consider for this patient?



Key learning points 🛭

Endocrinology, Photographic, Therapeutics

• Complaints of tiredness and weight gain in hypopituitary patients could be a sign of inadequate growth hormone replacement.

Explanation

The answer is found in the detailed case history not from some hidden clue in the slide (the picture really just shows pallor). This hypopituitary patient complains of tiredness and weight gain despite adequate standard hormone replacement therapy. His current symptoms appear to be related to a GH deficiency and would benefit from GH therapy.

He does not require DDAVP as there is no evidence of diabetes insipidus.

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Fludrocortisone is not required as adrenal function is preserved and mineralocorticoid activity, which depends on the reninangiotensin system and independent of pituitary function, is normal.

Orlistat, which is licensed for the treatment of obesity would not be required.

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BMJ On Exam

English French

Question 20 of 100

A 26-year-old woman with a history of type 1 diabetes comes to the clinic for review.

Despite maintaining a reasonable diet and good glycaemic control, she has lost weight and had problems with diarrhoea which is hard to flush away. Her current insulin regime is meal time Actrapid and Insulatard at night.

On examination her BP is 110/72 mmHg, pulse is 65 and regular, her BMI is 19. She looks pale and thin.

Investigations show:

Haemoglobin	109 g/L	(115 - 160)
White cell count	9.0 ×10 ⁹ /L	(4 - 11)
Platelets	188 ×10 ⁹ /L	(150 - 400)
Sodium	138 mmol/L	(135 - 146)
Potassium	3.9 mmol/L	(3.5 - 5)
Creatinine	110 μmol/L	(79 - 118)
Albumin	24 g/dL	(35 - 50)
HbA _{1c}	51 mmol/mol	(<53)
	6.8%	(<7.0)

Which of the following is likely to be the most effective treatment?

ErythromycinCodeine phosphate

Carbimazole

 \bigcirc

- O Gluten free diet
- O Pancreatic enzyme supplementation

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BMJ On Exam

English French



A 26-year-old woman with a history of type 1 diabetes comes to the clinic for review.

Despite maintaining a reasonable diet and good glycaemic control, she has lost weight and had problems with diarrhoea which is hard to flush away. Her current insulin regime is meal time Actrapid and Insulatard at night.

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Potassium	3.9 mmol/L	(3.5 - 5)
Creatinine	110 μmol/L	(79 - 118)
Albumin	24 g/dL	(35 - 50)
HbA _{1c}	51 mmol/mol	(<53)
	6.8%	(<7.0)

Which of the following is likely to be the most effective treatment?

Carbimazole	⊩ 1%
Erythromycin	■ 4%
Codeine phosphate	⊢ 1%
Gluten free diet 🗸	47%
Pancreatic enzyme supplementation	48%

Key learning points $\, \, \mathbb{Q} \,$



Endocrinology

• Coeliac disease is commonly associated with type 1 diabetes and will present with anaemia, malabsorption and low albumin on blood testing.

Explanation

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The presence of anaemia with low albumin raises the possibility of malabsorption, and the symptoms she describes support this. The most likely cause is <u>coeliac disease</u>, which occurs with increased frequency in patients with a history of type 1 diabetes.

Carbimazole would be a consideration for hyperthyroidism, although in this case the low albumin and anaemia suggests an alternative diagnosis.

Codeine phosphate is an option for diarrhoea related to diabetes-related dysmotility, and erythromycin is a prokinetic agent which may be of value where there are significant symptoms of reflux disease.

If further investigations confirmed pancreatic exocrine insufficiency, then enzyme supplementation may improve symptoms, although in this case <u>coeliac disease</u> is the more likely diagnosis.

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English French

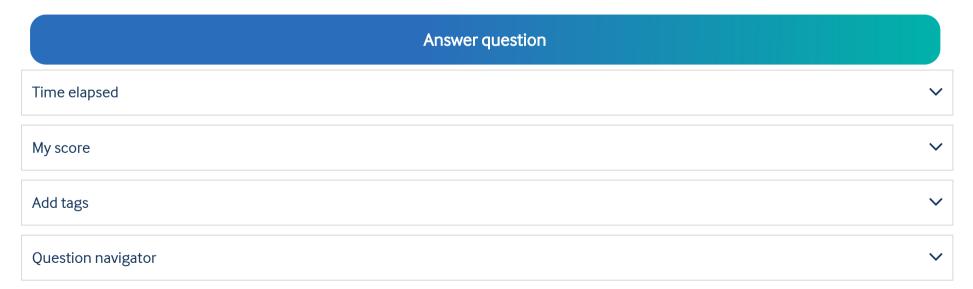
Question 21 of 100

This 34-year-old female presents with a one month history of weight loss, fatigue and this painless rash on her shin.



Which of the following investigations would you choose for this patient?

- O Chest x ray
- ACE concentrations
- Anti-thyroid antibodies
- OGD with duodenal biopsy
- O Fasting plasma glucose



BMJ On Exam

English French



This 34-year-old female presents with a one month history of weight loss, fatigue and this painless rash on her shin.



Which of the following investigations would you choose for this patient?

Chest x ray	
	9%
ACE concentrations	
	■ 4%
Anti-thyroid antibodies 🗸	
	71%
OGD with duodenal biopsy	
	■ 8%
Fasting plasma glucose 🗶	
	8 %

Key learning points 🛭

Dermatology, Endocrinology, Photographic

• Antithyroid antibodies are commonly associated with pre-tibial myxoedema.

Explanation

This is pre-tibial myxoedema with slightly raised, pinkish, indurated patches usually on the fronts of the shins or dorsum of the foot and often associated with acropachy.

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A high titre of antithyroid antibodies (for example, anti-TSH receptor) is invariably associated with the dermopathy. Pre tibial myxoedema is almost always associated with graves disease and therefore hyperthyroidism, which explains the weight loss in this lady.

Next question

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Question 22 of 100

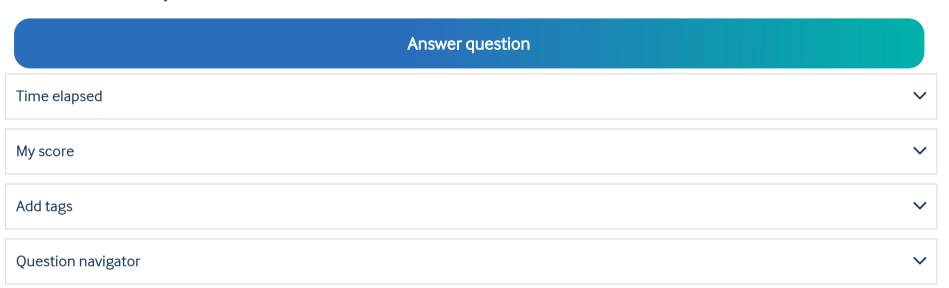
You are reviewing a gentleman with type 2 diabetes. He is on metformin and a once daily long-acting insulin analogue taken at night.

He tests his blood sugar first thing in the morning for monitoring and has contacted the surgery as he is getting some low readings. Over the last 1 -2 weeks he has had three readings between 3.0 and 4.0 mmol/L.

He is currently taking 40 units of insulin at night.

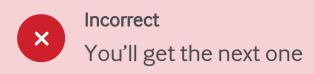
Which of the following is the most appropriate advice to give with regards to his insulin dose?

- O Reduce dose by 8 units
- O Reduce dose by 4 units
- O Reduce dose by 20 units
- O Reduce dose by 10 units
- Reduce dose by 2 units



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English French

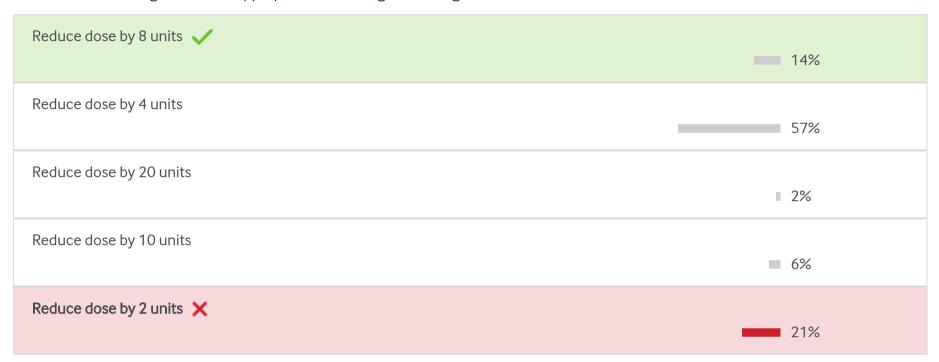


You are reviewing a gentleman with type 2 diabetes. He is on metformin and a once daily long-acting insulin analogue taken at night.

He tests his blood sugar first thing in the morning for monitoring and has contacted the surgery as he is getting some low readings. Over the last 1 -2 weeks he has had three readings between 3.0 and 4.0 mmol/L.

He is currently taking 40 units of insulin at night.

Which of the following is the most appropriate advice to give with regards to his insulin dose?



Key learning points 🛭

Diabetes, Endocrinology

• Reduce insulin dose in steps of 20% if hypoglycaemia occurs.

Explanation

Once daily long-acting insulin taken at night is monitored using pre-breakfast fasting glucose measurements. A fasting glucose level of 4-7 mmol/L is the ideal aim.

At least three consecutive, self-monitored fasting glucose readings should be used to adjust doses (i.e. three days minimum between dose adjustments). If fasting glucose is less than 4, then the insulin dose should be reduced. A good general rule of thumb is that when reducing the insulin doses you should do so in steps of 20%.

In this case, the gentleman is taking 40 units of insulin at night. 20% of 40 units is 8 units.

Subsequent monitoring will inform any further adjustments required.

Next question

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English French

Question 23 of 100

A 56-year-old female presents with a six month history of weight gain and nocturia.

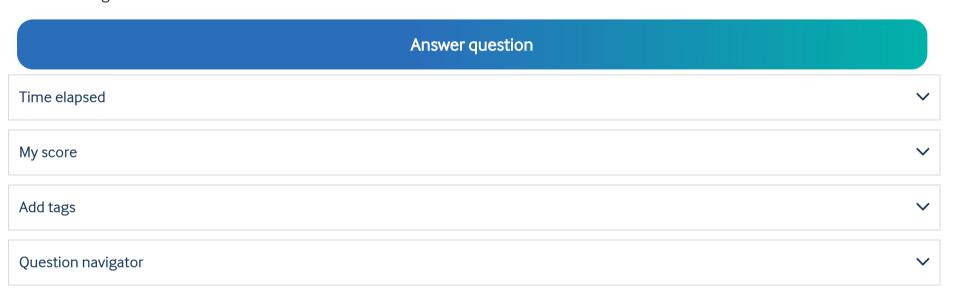
More recently she has developed candidal infection of the vulva. She has no other medical history of note other than her mother suffering from diabetes and having died of a stroke at the age of 76.

On examination she has a BMI of 35.2 kg/m 2 and a blood pressure of 130/82 mmHg. Dipstick urine reveals ++ glucose. A diagnosis of diabetes is subsequently confirmed with a fasting plasma glucose of 10.2 mmol/I and her HbA $_{1c}$ is 66 mmol/mol (8.2%).

Which of the following is the likely pathological entity that would underlie her diabetes?

0	Islet lymphocytic infiltration
\circ	Islet fibrosis
\bigcirc	Islet ferritin deposition

- O Islet amyloid deposition
- O Islet granuloma formation



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BMJ On Exam

English French



A 56-year-old female presents with a six month history of weight gain and nocturia.

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Which of the following is the likely pathological entity that would underlie her diabetes?



Key learning points 🛭



Diabetes

• Type 2 diabetes is associated with amyloid deposition within the islet cells.

Explanation

This patient has type 2 diabetes as suggested by the biochemistry, her presentation, her family history and her obesity. The characteristic features of type II diabetes is a marked hyalinisation of the islets which is due to infiltration by amyloid. The exact relationship between the two is not clear, but it appears that amyloid deposition is associated with reduced islet cell number and function.

For further revision it can be worth considering:

- How might this pathological development offer an insight into the development of T2DM?
- What other conditions could you think of that may be associated with excessive amyloid deposition? Are these found in excess with T2DM?

Further Reading:

Hull RL, et al. Islet Amyloid: A Critical Entity in the Pathogenesis of Type 2 Diabetes J Clin Endocrinol Metab. 2004;89:3629-43.

Next question

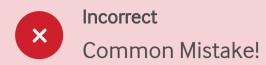
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BMJ On Exam

English French Question 24 of 100 ☆ High impact question Which of the following biochemical feature(s) is/are typical of Paget's disease? Elevated alkaline phosphatase \bigcirc Low calcium and parathyroid hormone \bigcirc Reduced N-telopeptide (NTx) \bigcirc Elevated alkaline phosphatase and gamma glutamyl transferase (GGT) \bigcirc Hyperphosphataemia **Answer question** Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



☆ High impact question

Which of the following biochemical feature(s) is/are typical of Paget's disease?

Elevated alkaline phosphatase 🗸	89%
Low calcium and parathyroid hormone	■ 2%
Reduced N-telopeptide (NTx)	
	■ 2%
Elevated alkaline phosphatase and gamma glutamyl transferase (GGT)	
	■ 5%
Hyperphosphataemia X	
	■ 2%

Key learning points 🛭



Endocrinology

• Paget's disease; metabolic bone disease; calcium and parathyroid hormone.

Explanation

Paget's disease is characterised by increased activity of both osteoblasts and osteoclasts, causing increased bone turnover. There is defective synthesis of new bone which causes deformity.

Paget's disease may be asymptomatic or may cause the following symptoms:

- Bone pain
- Bone warmth due to increased blood supply
- Nerve compression and deafness
- · Skull enlargement, and
- Bowing of the legs.

Complications include sequelae of nerve compression, high-output cardiac failure and rarely, osteogenic sarcoma.

Paget's disease is characterised by increased alkaline phosphatase showing increased osteoblastic activity. The following reflect the increase in osteoclastic activity:

- Elevated N-telopeptide (NTx)
- C-telopeptide (CTx), and
- Deoxypyridinoline.

Calcium, phosphate and PTH are usually normal.

Treatment is with bisphosphates, calcitonin and surgery if required.

Next question

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BMJ On Exam

English French

Question 25 of 100

A 38-year-old female presents with weight gain, hirsutism and hypertension of 2 years duration. She has also noted oligomenorrhoea over the last 2 years and over the last two months has had no periods.

Examination reveals a BMI of 32.4, a reddish complexion, with a blood pressure of 168/98 mmHg and abdominal striae. She has difficulty rising from a squatting position.

Normal

Investigations reveal the following:

U+E

O1E	Normal	_
FBC	Normal	-
Plasma glucose	12.1 mmol/L	(3.0-6.0)
Thyroxine	12.4 pmol/L	(10-22)
TSH	0.85 mU/L	(0.4-5)
Oestradiol	<80 pmol/L	(130-510)
LH	4.2 mU/L	(2-10)
FSH	2.1 mU/L	(2-10)
9 am Cortisol	550 nmol/L	(200-550)
ACTH (morning)	45	(8-50)
Midnight Cortisol	420 nmol/L	(<180)
ACTH (evening)	35	(8-20)
24hr Urine free cortisol	580 nmol/d	(90-290)
Chest x Ray	Normal	-
ECG shows	LVH	-
Cortisol at end of low dose dexamethasone test (48 hrs 0.5 mg qds)	210 nmol/L	-
Cortisol at end of high dose dexamthasone test (48 hrs 2mg qds)	150 nmol/L	-
MRI of pituitary	Normal	-

Which of the following apply to this patient?

- O The results suggest that she has Pseudo-Cushing's due to polycystic ovarian syndrome
- O She is likely to have ectopic Cushing's syndrome and should have a labelled octreotide scan
- O She is likely to have pituitary dependent Cushing's disease and requires Inferior petrosal sinus sampling with CRF stimulation

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- O She is likely to have an adrenal adenoma and should be confirmed with CT adrenals
- \bigcirc She is likely to have ectopic ACTH secretion and requires CT chest

Answer question	
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BMJ On Exam

English French



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Examination reveals a BMI of 32.4, a reddish complexion, with a blood pressure of 168/98 mmHg and abdominal striae. She has difficulty rising from a squatting position.

Investigations reveal the following:

U+E	Normal	-
FBC	Normal	-
Plasma glucose	12.1 mmol/L	(3.0-6.0)
Thyroxine	12.4 pmol/L	(10-22)
TSH	0.85 mU/L	(0.4-5)
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24hr Urine free cortisol	580 nmol/d	(90-290)
Chest x Ray	Normal	-
ECG shows	LVH	-
Cortisol at end of low dose dexamethasone test (48 hrs 0.5 mg qds)	210 nmol/L	-
Cortisol at end of high dose dexamthasone test (48 hrs 2mg qds)	150 nmol/L	-
MRI of pituitary	Normal	-

Which of the following apply to this patient?

The results suggest that she has Pseudo-Cushing's due to polycystic ovarian syndrome

20%

She is likely to have ectopic Cushing's syndrome and should have a labelled octreotide scan

7%

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She is likely to have pituitary dependent Cushing's disease and requires Inferior petrosal sinus sampling	ng with CRF stimulation 39%
She is likely to have an adrenal adenoma and should be confirmed with CT adrenals	19%
She is likely to have ectopic ACTH secretion and requires CT chest	16%

• Petrosal sinus sampling helps to differentiate pituitary from ectopic ACTH-dependent Cushing's syndrome

Explanation

Endocrinology

The results show lack of diurnal variation of cortisol with high urine free cortisol and lack of suppression with both low and high dose dexamethasone (cortisol should fall below 50 nmol/L). The elevated ACTH concentrations confirm ACTH dependent CS and exclude an adrenal source.

In the high dose dexamthasone suppression test, classically, the cortisol should suppress to 50% of the level found after low dose dexamethasone in cases of pituitary dependent CS. However 50% suppression is found on less than 80% of occasions and so is far from diagnostic.

Usually the cause of Cushing's disease is a pituitary microadenoma and this may not be seen on MR. However, the best way of distinguishing between ectopic and pituitary dependent CS is with inferior petrosal sinus sampling where a high gradient of ACTH from sinus compared with a peripheral sample is diagnostic of pituitary dependent disease.

CT scan and octreotide scintigraphy should be employed when results of IPSS suggest an ectopic source.

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BMJ On Exam

English French

Question 26 of 100

A 44-year-old woman with type 1 diabetes mellitus has not attended the diabetic clinic for five years.

Examination shows no abnormalities.

Investigations show:

 Haemoglobin
 90 g/L
 (115-165)

 MCV
 94 fL
 (80-96)

 Haematocrit
 28%

 HbA_{1c}
 87 mmol/mol
 (20-42)

10.1% (3.8-6.4)

A blood smear shows normochromic, normocytic anaemia.

Which of the following is the most likely cause?

- O Sideroblastic anaemia
- Erythropoietin deficiency
- Microangiopathic haemolysis
- O Chronic lymphocytic leukaemia (CLL)
- Acute blood loss

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BMJ On Exam

English French



A 44-year-old woman with type 1 diabetes mellitus has not attended the diabetic clinic for five years.

Examination shows no abnormalities.

Investigations show:

 Haemoglobin
 90 g/L
 (115-165)

 MCV
 94 fL
 (80-96)

 Haematocrit
 28%

 HbA_{1c}
 87 mmol/mol
 (20-42)

10.1%

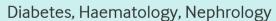
A blood smear shows normochromic, normocytic anaemia.

(3.8-6.4)

Which of the following is the most likely cause?



Key learning points $\, \, \mathbb{Q} \,$



• Anaemia associated with diabetes is often due to reduced erythropoietin release due to chronic renal failure.

Explanation

The most likely cause is progressive renal failure which leads to reduced release of erythropoietin from the kidneys.

Sideroblastic anaemia (myelodysplasia) is seen in older age groups.

CLL or microangiopathic haemolysis are possible causes but unlikely.

Next question

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BMJ On Exam

English French

Question 27 of 100

A 64-year-old lady presented to the Emergency department with orbital pain and swelling (shown below):



She had been under review in the endocrinology clinic and had been started on some new treatment four weeks previously.

Thyroid function four weeks ago showed:

T4 99 μ g/dL (5 - 12)

TSH <0.04 mU/L (0.4 - 6.0)

Thyroid function in the Emergency department shows:

T4 $2 \mu g/dL$ (5 - 12)

TSH 28 mU/L (0.4 - 6.0)

What treatment has she received?

- Radioiodine
- Propranolol
- Prednisolone
- Carbimazole
- Propylthiouracil

Time elapsed My score Add tags Question navigator

9/10/24, 10:26 AM BMJ OnExamination Assessment

BMJ On Exam

English French



A 64-year-old lady presented to the Emergency department with orbital pain and swelling (shown below):



She had been under review in the endocrinology clinic and had been started on some new treatment four weeks previously.

Thyroid function four weeks ago showed:

T4 99 μ g/dL (5 - 12)

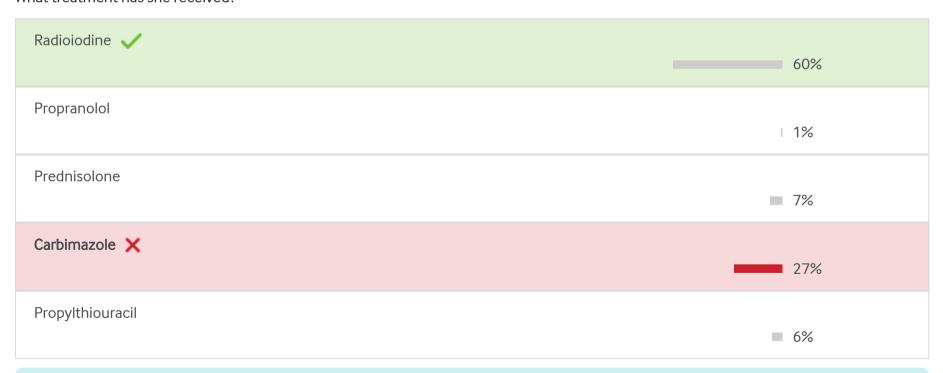
TSH <0.04 mU/L (0.4 - 6.0)

Thyroid function in the Emergency department shows:

T4 $2 \mu g/dL$ (5 - 12)

TSH 28 mU/L (0.4 - 6.0)

What treatment has she received?



Endocrinology, Ophthalmology, Photographic, Therapeutics

• Radioiodine therapy can worsen thyroid eye disease

Explanation

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The slide shows malignant exophthalmos. In this case malignant refers to the rapidity of onset and threat to eyesight rather than association with malignancy.

Radioiodine therapy can worsen thyroid-associated ophthalmopathy; patients with thyroid eye disease are generally treated with steroids for one to two weeks prior to starting radioiodine therapy.

Treatment for malignant exophthalmos is rapid administration of steroids. Where sight is threatened, orbital decompression may be necessary.

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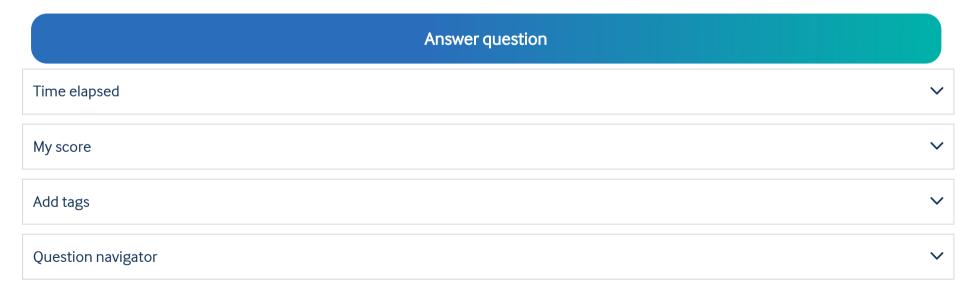
Question 28 of 100

This is the hand of a 44-year-old male who presents with abdominal pain.



What is the cause for his abdominal pain?

- O Non-alcoholic fatty liver disease (NAFLD)
- Pancreatitis
- Diverticulitis
- Splenic rupture
- O Diabetic ketoacidosis



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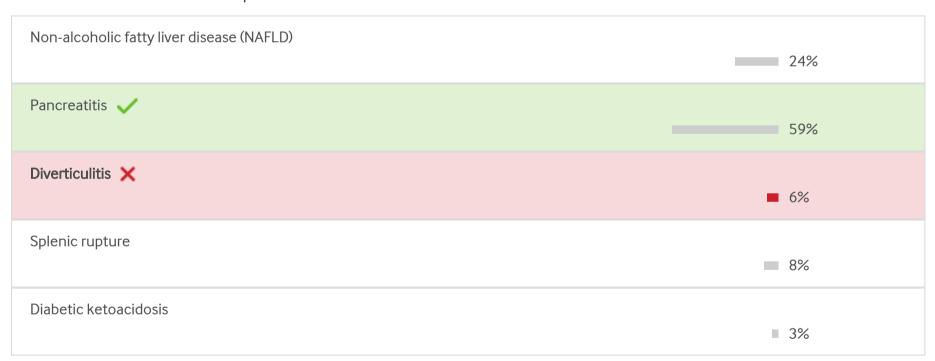
English French



This is the hand of a 44-year-old male who presents with abdominal pain.



What is the cause for his abdominal pain?



Key learning points $\, \, \mathbb{Q} \,$

Cardiology, Endocrinology, Lipids, Photographic

• Type 3 hyperlipidaemia is associated with tendon xanthoma, pancreatitis and premature cardiovascular disease.

Explanation

A tricky question.

Here you can see palmar xanthoma diagnostic of type III hyperlipidaemia.

This is characterised by excess intermediate density lipoprotein (IDL) concentrations giving equally elevated total cholesterol and triglyceride concentrations.

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Type III hyperlipidaemia, also known as remnant particle disease, is characterised by:

- Autosomal recessive with variable penetrance
- Accumulation of remnants of IDL and chylomicrons, and
- Genetic polymorphism of the ApoE protein which reduces its binding to its receptor and slows the processing of lipoproteins

Affected homozygotes may be asymptomatic until an additional insult occurs affecting lipoprotein metabolism, such as the development of obesity or diabetes mellitus.

Consequences include premature cardiovascular disease and pancreatitis.

There is no association with diverticulitis and he slightly too young to be typical for diverticulitis.

NAFLD does not cause abdominal pain.

Splenic rupture usually is preceded by trauma

Next question

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BMJ OnExamination Assessment

BMJ On Exam

English French Question 29 of 100 ★ High impact question Which of the following characteristics are consistent with growth hormone (GH) deficiency in adults? Reduced serum lipids Abnormal body composition \bigcirc \bigcirc Reduced risk of fracture \bigcirc Increased IGF-1 concentrations \bigcirc Diabetes mellitus **Answer question** Time elapsed My score Add tags Question navigator

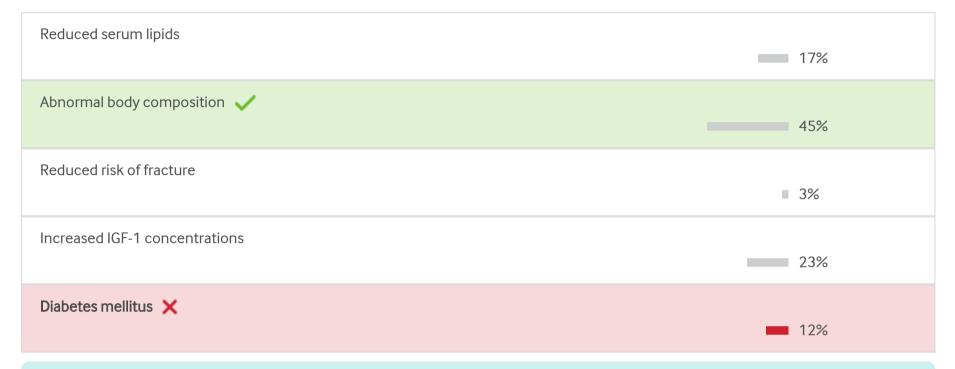
BMJ On Exam

English French



★ High impact question

Which of the following characteristics are consistent with growth hormone (GH) deficiency in adults?



Key learning points 🛛



Endocrinology

• Growth hormone deficiency occurs in abnormal body composition such as short stature of growth retardation.

Explanation

Growth hormone deficiency is uncommon in children and in adults. In children, short stature is often idiopathic and only around 8% of referred patients will have GH deficiency.

In adults GH deficiency most commonly occurs after pituitary surgery or radiotherapy. It can be insidious in its presentation and may be asymptomatic. There is some evidence that it can cause altered body composition, which can be treated. Baum and colleagues (see below) found that adult patients with GH deficiency treated with recombinant GH had improved bone mineral density, reduced fat mass and increased lean tissue mass after 18 months. GH deficiency in adults has also been associated with premature mortality.

The diagnosis of GH deficiency often requires dynamic function testing. The gold standard test is the insulin tolerance test, where insulin is given to stimulate significant hypoglycaemia (glucose less than 2.2 mmol/L). This provokes GH and adrenocorticotropic hormone (ACTH) release. Samples are taken at baseline and at 30, 60 and 90 minutes. A normal result is a rise in cortisol to more than 550 nmol/L and a rise in GH to more than 10 µg/L. Patients with a history of seizures or heart disease are unsuitable for this test.

A random growth hormone level must be interpreted with caution due to significant diurnal variation. A level of GH greater than 3 µg/L probably excludes GH deficiency. Normal GH stimulates IGF-1 release and IGF-1 concentrations are often low in GH deficiency.

GH release is increased by:

- Deep sleep
- Fasting
- · Alpha adrenergic activity
- Stress
- Exercise
- Sex steroids
- Hypoglycaemia

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- Amino acids
- Thyroxine, and
- Ghrelin.

GH release is inhibited by:

- Somatostatin
- Cortisol
- Beta adrenergic activity
- Hyperglycaemia
- Obesity
- Free fatty acids
- Hypothyroidism, and
- IGF-1.

Further Reading:

- 1. Baum HB, Biller BM, Finkelstein JS, et al. Effects of physiologic growth hormone therapy on bone density and body composition in patients with adult-onset growth hormone deficiency. A randomized, placebo-controlled trial. Ann Intern Med. 1996;125:883-90.
- 2. Molitch ME, Clemmons DR, Malozowski S, et al. <u>Evaluation and treatment of adult growth hormone deficiency: an Endocrine Society clinical practice guideline.</u> *J Clin Endocrinol Metab.* 2011;96:1587-609.

Next question

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BMJ On Exam

English French

Question 30 of 100

A 35-year-old woman presents to the endocrine clinic with a lump on the left side of her neck. She has noticed this for a few weeks and has become increasingly concerned.

Her BP is 135/72 mmHg, pulse is 70 and regular, and there is no sweating and no tremor. She has a pea sized lump on the left side of the thyroid.

Investigations show:

Hb 130 g/L (115-160)

WCC $7.0 \times 10^9 / L$ (4-11)

PLT 178 ×10⁹/L (150-400)

Na 139 mmol/L (135-146)

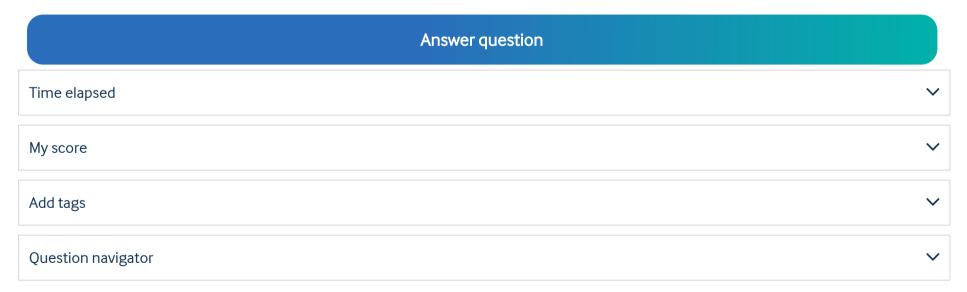
K 4.2 mmol/L (3.5-5.0)

Cr 112 μmol/L (79-118)

TSH 0.8 IU/L (0.5-4.5)

Which of the following is the most appropriate next investigation?

- Excision biopsy
- Ultrasound thyroid
- O Thyroid autoantibodies
- O Radioisotope scan
- Fine needle aspiration biopsy



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BMJ On Exam

English French



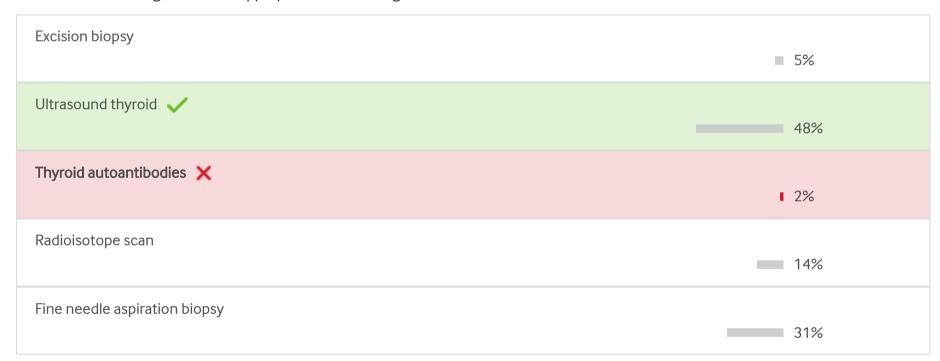
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Investigations show:

Hb	130 g/L	(115-160)
WCC	7.0 ×10 ⁹ /L	(4-11)
PLT	178 ×10 ⁹ /L	(150-400)
Na	139 mmol/L	(135-146)
K	4.2 mmol/L	(3.5-5.0)
Cr	112 μmol/L	(79-118)
TSH	0.8 11.1/1	(0 5-4 5)

Which of the following is the most appropriate next investigation?



Key learning points



Endocrinology

• Thyroid ultrasound is the most useful investigation for characterising thyroid nodules.

Explanation

Thyroid ultrasound is the most useful investigation for characterising thyroid nodules. It can show cystic lesions 2 mm or greater in diameter, and solid lesions 3 mm or greater in diameter. Only around 4-7% of lesions detected on ultrasound are clinically palpable.

Fine needle aspiration is appropriate after ultrasound, indeed ultrasound can be used to localise the lesion for aspiration. FNA is the most important investigation once a lesion is recognised as solitary.

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Radioisotope scanning confirms uptake by one or more nodules in the thyroid; nodules which take up the isotope are less likely to be malignant.

Excision biopsy is required for equivocal lesions on fine needle aspiration.

Next question

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BMJ OnExamination Assessment

BMJ On Exam

English French

Question 31 of 100

A 41-year-old woman presents with a history of weight loss and anxiety.

She has a three year history of thyrotoxicosis for which she has been treated with previous courses of carbimazole but has failed to attend scheduled outpatient appointments for over one year.

Following the course of carbimazole which was stopped approximately two years ago she felt much better but was still aware of a goitre. Most recently she has become aware of a more prominent swelling of the right side of the neck and her symptoms of anxiety with a 3 kg weight loss. Currently she takes no medication but is a smoker of 10 cigarettes daily.

On examination she has, a pulse of 96 beats per minute, a fine tremor of the outstretched hands, lid lag and some periorbital puffiness. There is a moderately enlarged and diffuse goitre with a more prominent 3 cm nodule on the left of the gland which is non-tender. Over the goitre is a bruit and no lymphadenopathy is palpable. No other abnormalities are noted.

Investigations reveal:

 \bigcirc

 \bigcirc

Free T4	37.3 pmol/L	(10-22)	
TSH	0.05 mU/L	(0.4-5)	
Thyroid peroxidase antibodies	1:2400 U/L		
I123 uptake scan	Diffuse uptake with no upt	ake in left nodule	
What is the most likely cause of the thyroid nodule?			
O Toxic multinodular goitre			
O De Quervain's thyroiditis			

Medullary carcinoma of the thyroid

Papillary carcinoma of the thyroid

\circ	Graves' disease	
	Answer question	
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9/10/24, 10:27 AM **BM.I OnExamination Assessment**

BMJ On Exam

English French



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On examination she has, a pulse of 96 beats per minute, a fine tremor of the outstretched hands, lid lag and some periorbital puffiness. There is a moderately enlarged and diffuse goitre with a more prominent 3 cm nodule on the left of the gland which is non-tender. Over the goitre is a bruit and no lymphadenopathy is palpable. No other abnormalities are noted.

Investigations reveal:

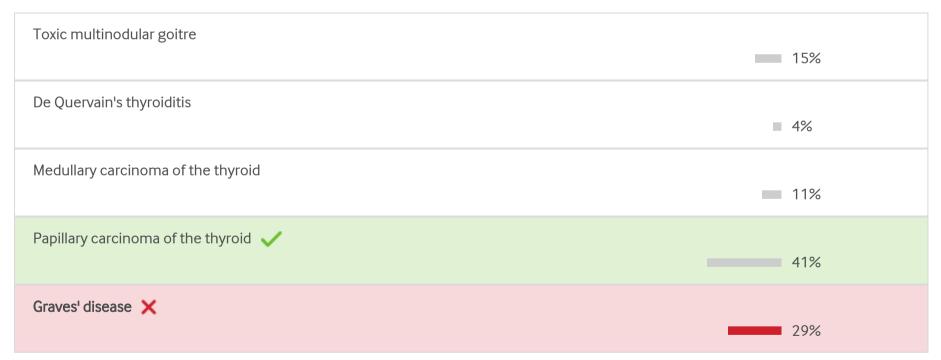
Free T4 3	37.3 pmol/L	(10-22)
-----------	-------------	---------

TSH 0.05 mU/L (0.4-5)

Thyroid peroxidase antibodies 1:2400 U/L

I123 uptake scan Diffuse uptake with no uptake in left nodule

What is the most likely cause of the thyroid nodule?





Endocrinology

• Grave's disease is associated with papillary carcinoma

Explanation

This woman has hyperthyroidism but the prominent nodule which is 'cold' on uptake scanning is highly suggestive of thyroid carcinoma and the mostly likely diagnosis is Graves' disease (periorbital puffiness and thyroid bruit) associated with papillary thyroid carcinoma.

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<u>Thyroid cancer</u> associated with Graves' disease is not uncommon¹ and usually due to papillary carcinoma and must be considered in suspicious/expanding nodules rather than attributing purely to Graves' disease.

Thyroid peroxidase antibodies are found in more than 70% of cases of Grave's disease ².

Reference:

- 1. Stocker DJ, Burch HB. Thyroid cancer yield in patients with Graves' disease. Minerva Endocrinol. 2003;28:205-12.
- 2. GP Notebook. <u>Thyroid Antibodies.</u>

Next question

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English French

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Question 32 of 100

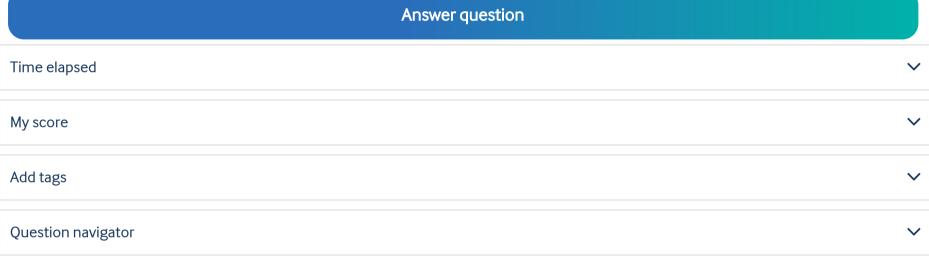
A 65-year-old woman presents with deteriorating wheeze and dyspnoea.

She has been diagnosed with asthma over the last 15 years and is treated with inhaled salbutamol, inhaled fluticasone and has received numerous courses of prednisolone. Currently, she is receiving 15 mg of prednisolone daily as a reducing dose.

Four years ago, she had also received cyclical hormone replacement therapy (HRT) for post-menopausal flushes but this was stopped after one year of therapy when she developed a deep vein thrombosis.

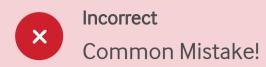
What treatment would you select as prophylaxis against osteoporosis?

Time	e elapsed	
		Answer
	Calcium	
\circ	Raloxifene	
\circ	Salmon calcitonin	
\circ	Alendronate	
\circ	Calcium and ergocalciferol	



BMJ On Exam

English French



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Four years ago, she had also received cyclical hormone replacement therapy (HRT) for post-menopausal flushes but this was stopped after one year of therapy when she developed a deep vein thrombosis.

What treatment would you select as prophylaxis against osteoporosis?



Key learning points 🛭



Endocrinology, Metabolism, Pharmacology, Rheumatology

• Bisphosphonates are first line use for prevention of osteoporosis in post-menopausal women on steroids.

Explanation

This patient is at high risk of developing osteoporosis being post-menopausal and receiving high doses of steroids.

Of the therapies listed the most appropriate is the bisphosphonate, alendronate. NICE guidelines suggest the use of bisphosphonates where steroids are used over the longer term for the prevention of osteoporosis. This treatment should be for 3-5 years and patients should be made aware that it is not preventative but reduces risk.

Calcitonin is administered subcutaneously and is not appropriate.

Raloxifene is a selective estrogen receptor modulator (SERM) and is an appropriate therapy for the prevention and treatment of post-menopausal osteoporosis but like HRT may be associated with an increased risk of thromboembolism and should not be used in this case.

Calcium and vitamin D are useful adjuncts but would not prevent steroid induced osteoporosis.

Reference:

NICE. Osteoporosis: assessing the risk of fragility fracture (CG146).

Next question

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BMJ On Exam

English French

Question 33 of 100

A 40-year-old woman presents with tiredness, weight gain and fatigue of over one year's duration.

Two years ago she underwent trans-sphenoidal resection of a non-functioning pituitary tumour. Post-operatively she was confirmed to have pan-hypopituitarism and is receiving treatment with hydrocortisone 10 mg mane and 5 mg nocte, thyroxine 100 µg daily, and takes the oral contraceptive Logynon.

On examination she has a blood pressure of 110/64 mmHg, a pulse of 80 bpm and appears clinically euthyroid.

Investigations show:

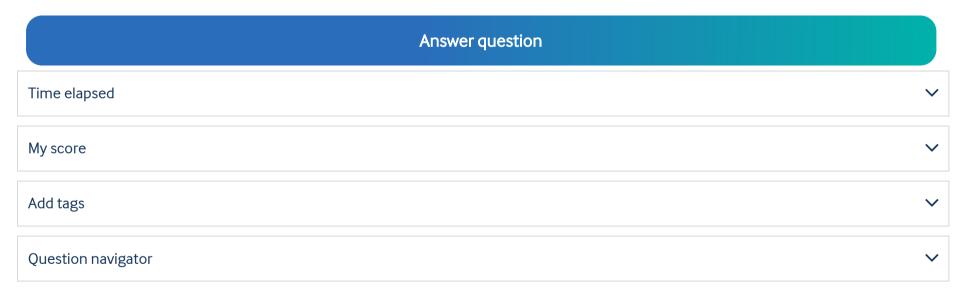
Free T4 12.5 pmol/L (10-22)

Plasma TSH 0.2 mU/L (0.4-5.0)

Serum oestradiol <80 pmol/L (130-550)

What is the most appropriate treatment for this patient's fatigue?

- O DDAVP
- Fludrocortisone
- Growth hormone
- Increase dose of hydrocortisone
- Increase dose of oestrogen



BMJ On Exam

English French



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On examination she has a blood pressure of 110/64 mmHg, a pulse of 80 bpm and appears clinically euthyroid.

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Free T4 12.5 pmol/L (10-22)

Plasma TSH 0.2 mU/L (0.4-5.0)

Serum oestradiol <80 pmol/L (130-550)

What is the most appropriate treatment for this patient's fatigue?



Endocrinology

• Patients taking OCP will have unrecordable ostradiol levels

Explanation

This woman underwent a hypophysectomy for a non-functioning pituitary tumour and since then has had problems with tiredness and fatigue.

All her hormonal deficiencies are replaced other than growth hormone.

The low thyroid-stimulating hormone is a reflection of the hypopituitarism but the thyroxine is within the normal range.

Her dose of hydrocortisone is adequate.

Next question

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She is taking a synthetic oestrogen - ethinyl oestradiol, for oestrogen replacement and this is not detectable on the traditional oestradiol assay. So this is why the oestradiol concentration is unrecordable and is also the reason why oestradiol should not be requested (but unfortunately is) whilst patients are taking the combined OCP.

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BMJ On Exam

English French

Question 34 of 100

☆ High impact question

A 56-year-old female presents with a six month history of weight loss, loose motions and flushes.

She passed through the menopause over five years ago and was untroubled at that stage. However, her current symptoms have deteriorated over the last six months. She opens her bowels with diarrhoea four times daily, has intermittent flushes and has lost approximately 6 kg in weight over this period. She currently takes no medication and but has a two year history of type 2 diabetes for which she is on diet treatment alone. She is a non-smoker and drinks approximately 10 units of alcohol weekly.

On examination, she has a BMI of 28.1 kg/m^2 , pulse of 80 bpm and a blood pressure of 128/78 mmHg. Auscultation of the chest reveals a couple of scattered expiratory wheezes. Examination of the abdomen revealed 4 cm hepatomegaly.

Investigations reveal:

Full blood count	Normal	-
Urea and electrolytes	Normal	-
Plasma glucose	8.8 mmol/L	(3.0-6.0)
HbA _{1c}	62 mmol/mol	(20-46)
	7.8%	(3.8-6.4)
AST	28 U/L	(1-31)
ALT	30 U/L	(5-35)
Gamma GT	28 U/L	(4-35)
Alkaline phosphatase	128 U/L	(60-110)
Oestradiol	63 pmol/L	(120-800)
LH	55 U/L	(>40)
FSH	88 U/L	(>50)
Free T4	15.8 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
Urine analysis	Glucose+	
Urine hydroxyindoleacetic acid (HIAA)	148 μmol/24hr	(10-50)

What is the most appropriate therapy for this patient?

- O Metformin therapy
- O Hepatic artery embolisation
- Oestrogen replacement therapy
- Insulin therapy

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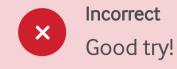
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Somatostatin analogues

Answer q	uestion
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BMJ On Exam

English French



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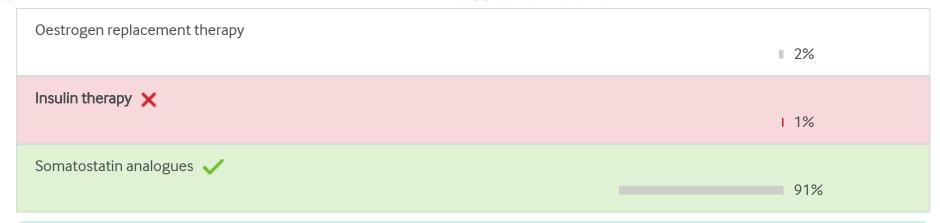
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AST	28 U/L	(1-31)
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Gamma GT	28 U/L	(4-35)
Alkaline phosphatase	128 U/L	(60-110)
Oestradiol	63 pmol/L	(120-800)
LH	55 U/L	(>40)
FSH	88 U/L	(>50)
Free T4	15.8 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
Urine analysis	Glucose+	
Urine hydroxyindoleacetic acid (HIAA)	148 μmol/24hr	(10-50)

What is the most appropriate therapy for this patient?

Metformin therapy	■ 2%
Hepatic artery embolisation	■ 4%



Key learning points 🛭

Diabetes, Endocrinology, Pharmacology

• Somatostatin analogues improve symptoms and prognosis in carcinoid syndrome

Explanation

This patient has <u>carcinoid syndrome</u> as reflected by the symptoms, signs and elevated urine HIAA. The most appropriate therapy would be somatostain analogues which are demonstrated to improve symptoms and prognosis. Her hepatomegaly ultimately represents the presence of hepatic metastases, therefore surgical intervention is likely to be inappropriate.

Hepatic artery embolisation would not be considered unless SMS therapy was unable to control symptoms.

This patient's diabetic control is not responsible for her symptoms and the most pressing task is to recognise and treat her carcinoid syndrome. In fact, the weight loss may actually cause an improvement in her glycaemic control plus metformin may produce a deterioration in her gastrointestinal symptoms.

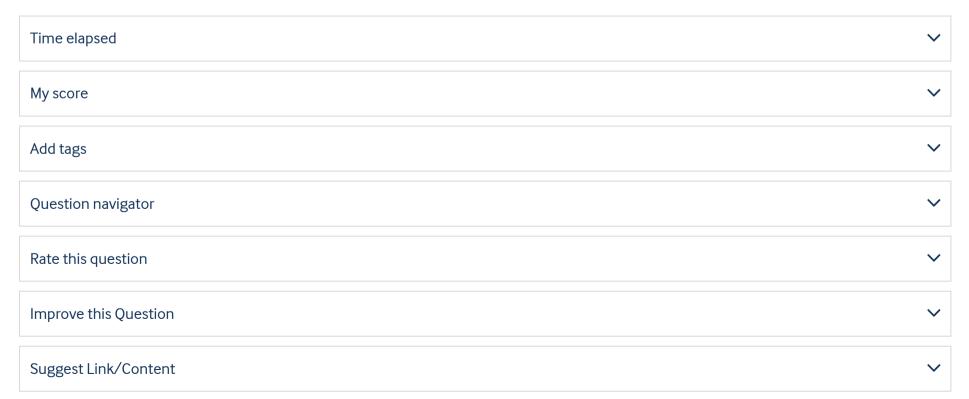
She has postmenopausal luteinising hormone (LH) follicle-stimulating hormone (FSH) and oestradiol and her symptoms are not due to the menopause.

Next question

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English French

Question 35 of 100

★ High impact question

A 60-year-old male who is the professor of endocrinology presents to the Emergency department with acute shortness of breath after a transatlantic flight. He has otherwise been quite well.

Examination reveals a pulse of 102 bpm, his oxygen saturations are 90% on air and he has a blood pressure of 118/90 mmHg. His legs appear normal and chest examination is fine.

On the clinical suspicion of a pulmonary embolism he is commenced on IV heparin therapy and this is confirmed on a VQ scan.

Given his occupation, thyroid function tests are performed despite no overt features of thyrotoxicosis and return revealing:

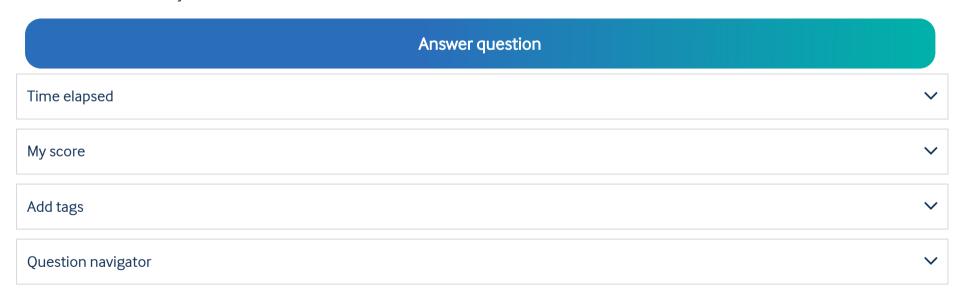
TSH 1.3 mU/L (0.35-5.0)

free T4 43.4 pmol/L (9.8-21.2)

free T3 6.7 pmol/L (3.5-6.8)

Which of the following is the likely cause of the professor's abnormal thyroid function tests?

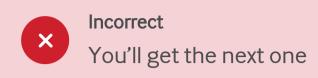
- Graves' hyperthyroidism
- O Subclinical hyperthyroidism
- O Toxic thyroid nodule
- O Heparin treatment
- O Hashimoto's thyroiditis



9/10/24, 10:28 AM BMJ OnExamination Assessment

BMJ On Exam

English French



★ High impact question

A 60-year-old male who is the professor of endocrinology presents to the Emergency department with acute shortness of breath after a transatlantic flight. He has otherwise been quite well.

Examination reveals a pulse of 102 bpm, his oxygen saturations are 90% on air and he has a blood pressure of 118/90 mmHg. His legs appear normal and chest examination is fine.

On the clinical suspicion of a pulmonary embolism he is commenced on IV heparin therapy and this is confirmed on a VQ scan.

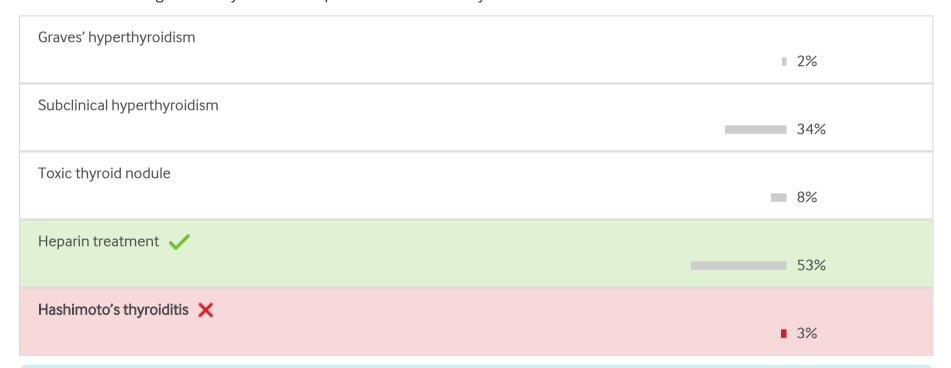
Given his occupation, thyroid function tests are performed despite no overt features of thyrotoxicosis and return revealing:

TSH 1.3 mU/L (0.35-5.0)

free T4 43.4 pmol/L (9.8-21.2)

free T3 6.7 pmol/L (3.5-6.8)

Which of the following is the likely cause of the professor's abnormal thyroid function tests?





• Heparin causes a false rise in free T4 due to displacement on assay

Explanation

Heparin is having an "in vitro" effect on thyroxine (T4) levels.

IV heparin interferes with the thyroid function tests assay on occasions displacing bound thyroid hormone.

These test results are not compatible with primary hyperthyroidism as the thyroid-stimulating hormone is not suppressed.

Subclinical hyperthyroidism would have low/suppressed TSH and *normal* T4 levels.

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Reference:

Laji K, Rhidha B, John R, et al. Abnormal serum free thyroid hormone levels due to heparin administration. QJM. 2001 Sep;94:471-3.

Next question

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9/10/24, 10:28 AM BMJ OnExamination Assessment

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English French

Question 36 of 100

☆ High impact question

A 55-year-old man was diagnosed with atrial fibrillation and commenced on amiodarone two years ago.

His thyroid function tests prior to commencing amiodarone were normal. He subsequently developed hyperthyroidism whilst on amiodarone.

Amiodarone was stopped four months ago and he was commenced on 40 mg carbimazole OD but he continued to lose weight despite maintaining a good appetite.

His other medications comprised digoxin 250 micrograms OD and warfarin as per INR. There was no family history of thyroid disease. On examination, pulse was 92 beats per minute, irregularly irregular, blood pressure was 130/70 mmHg. There was no goitre palpable on neck examination and he had no visible tremors.

Investigations showed:

Serum sodium	138 mmol/L	(137-144)
Serum potassium	4.1 mmol/L	(3.5-4.9)
Serum urea	3.8 mmol/L	(2.5-7.5)
Serum creatinine	88 μmol/L	(60-110)
Plasma free T4	56 pmol/L	(10-22)
Plasma free T3	14.2 pmol/L	(5-10)
Plasma thyroid-stimulating hormone	<0.02 mU/L	(0.4-5)
Serum antithyroid peroxidase	12 U/mL	(<50)
TSH receptor antibodies	<1 U/L	(<7)

Radioactive iodine uptake scan (off carbimazole) revealed less than 1% uptake by thyroid gland.

What is the most likely diagnosis?

\bigcirc	lodine induced thyrotoxicosis from Wolff-Chaikoff effect
\bigcirc	Graves' disease
\bigcirc	Amiodarone induced thyroiditis
\bigcirc	Thyroid hormone resistance
\bigcirc	lodine induced thyrotoxicosis from Jod-Basedow effect

Answer question

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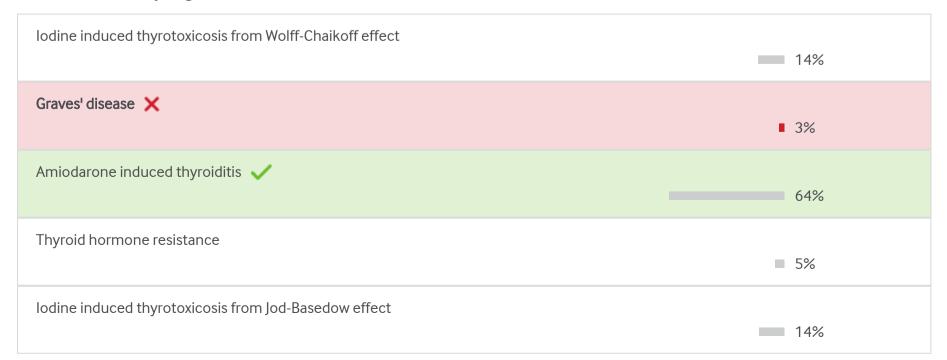
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Radioactive iodine uptake scan (off carbimazole) revealed less than 1% uptake by thyroid gland.

What is the most likely diagnosis?



Key learning points $\, \mathbb{Q} \,$

Endocrinology

• Amiodarone can cause both hypothyroidism and thyrotoxicosis

Explanation

This patient taking amiodarone has elevated thyroxine (T4), tri-iodothyronine (T3) and suppressed thyroid-stimulating hormone (TSH).

The most likely diagnosis is an amiodarone-induced thyroiditis in view of the high concentrations and the suppressed uptake scan. In addition, carbimazole will have little effect on thyroiditis where the usual treatment is prednisolone 40-60 mg.

With a Jod-Basedow effect one would expect increased uptake on the radio-iodine uptake scan hence distinguishing between the two.

Amiodarone contains 75 mg of iodine per 200 mg tablet. In addition, the half life is very long (100 days) and can result in prolonged effects even after stopping therapy for several months.

Similarly the absence of antibodies argues against Graves'.

Next question

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Question 37 of 100

A 25-year-old woman presents to the Emergency department with a severe viral upper respiratory tract infection. She has a history of type 1 diabetes for which she takes a basal bolus insulin regime and a recent HbA_{1c} was elevated at 66 mmol/mol.

On examination her BP is 100/65 mmHg, pulse is 95 and regular and she has a respiratory rate of 28. Her BMI is 21.

Investigations show:

Hb	124 g/L	(115-160)
WCC	9.1 ×10 ⁹ /L	(4-11)
PLT	189 ×10 ⁹ /L	(150-400)
Na	137 mmol/L	(135-146)
K	3.4 mmol/L	(3.5-5.0)
Cr	129 μmol/L	(79-118)
Bicarb	14 mmol/L	(22-30)
рН	7.12	(7.35-7.45)

 $She is \ started \ on \ an \ insulin \ infusion \ and \ is \ rehydrated \ aggressively. \ Bloods \ are \ repeated \ two \ hours \ later.$

Repeat investigations show:

Na 138 mmol/L (135-146) K 4.0 mmol/L (3.5-5.0) Cr 121 μmol/L (79-118) Bicarbonate 19 mmol/L (22-30) pH 7.25 (7.35-7.45)

The nursing staff have become very worried as she has become unconscious.

What is most likely to have occurred?

\circ	Cerebral oedema
\circ	Worsening tissue acidosis
\circ	Cerebral haemorrhage
\circ	Cerebral infarct
\bigcirc	Worsening sepsis

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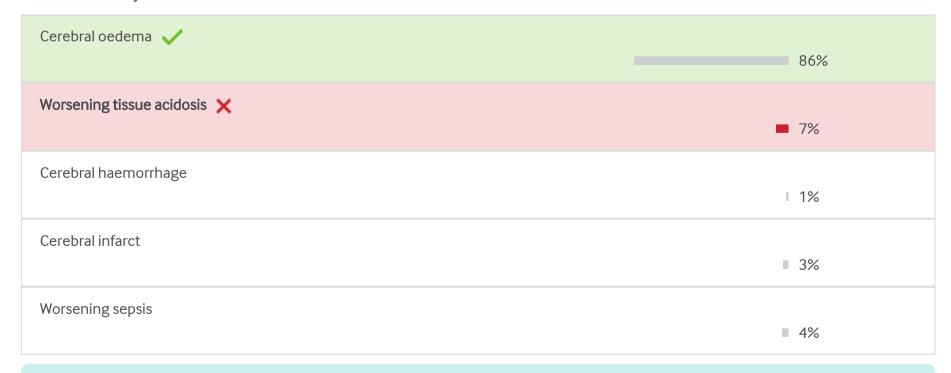
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The nursing staff have become very worried as she has become unconscious.

What is most likely to have occurred?



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Endocrinology

• Cerebral oedema in association with diabetic ketoacidosis (DKA) Is more common in children.

Explanation

Cerebral oedema in association with <u>diabetic ketoacidosis</u> (DKA) is rarely described in adults versus the paediatric population, but the pathophysiology is thought to be similar, with fluid shifts being the causative mechanism.

With biochemical parameters improving, worsening tissue acidosis and worsening sepsis are both highly unlikely.

We also have no reason to believe a cerebral haemorrhage has occurred.

Out of the two remaining options, infarct and oedema, cerebral oedema is recognised to be associated with DKA.

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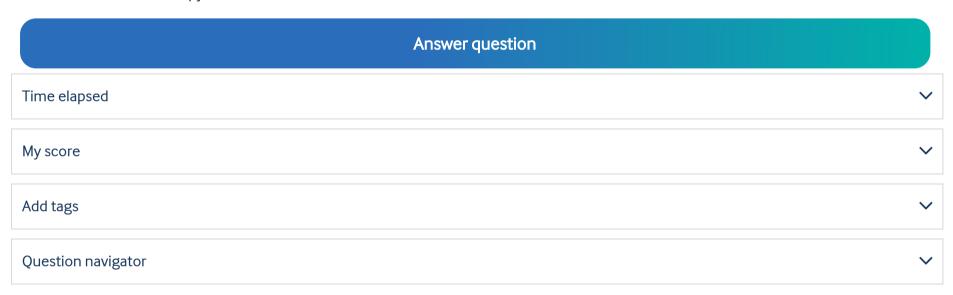
Question 38 of 100

A 39-year-old woman with a history of Graves' disease comes to the Emergency department complaining of bilateral blurring of vision and loss of colour perception.

On examination she has obvious bilateral thyroid eye disease with marked proptosis. She is currently managed on a block replace regime to control her thyroid function.

Which of the following is the most appropriate way to manage her eye disease?

- O High dose corticosteroids
- Surgical decompression
- Methotrexate
- Azathioprine
- Orbital radiotherapy



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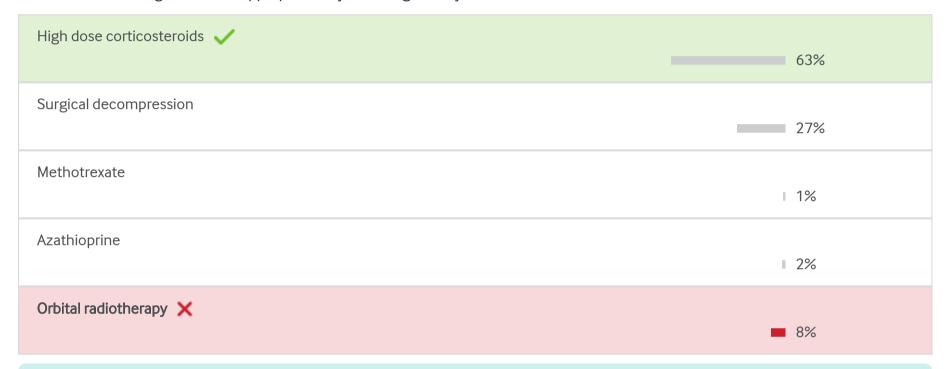
English French



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On examination she has obvious bilateral thyroid eye disease with marked proptosis. She is currently managed on a block replace regime to control her thyroid function.

Which of the following is the most appropriate way to manage her eye disease?



Key learning points 🛭



Endocrinology

• Grave's disease with symptoms consistent with acute progressive optic neuropathy which occurs due to stretching of the optic nerve requires urgent high dose steroids.

Explanation

This patient has symptoms consistent with acute progressive optic neuropathy which occurs due to stretching of the optic nerve. Other features include reduced visual acuity, a visual field defect and a relative afferent papillary defect.

Azathioprine and methotrexate are steroid sparing agents used in the management of thyroid eye disease, but it is high dose corticosteroids which are used first line.

Orbital decompression surgery may be used in the acute situation when the response to corticosteroids is not adequate.

The role of orbital radiotherapy is considered controversial as early studies are not thought to have been properly controlled for potential bias.

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Question 39 of 100

A 62-year-old female is referred with mild confusion.

She has a history of depression, type 2 diabetes mellitus and angina for which she takes a variety of medications.

Investigations reveal:

Sodium concentration 123 mmol/L (137-144)

Potassium 3.4 mmol/L (3.5-4.9)

Urea 5.2 mmol/L (2.5-7.5)

Creatinine 70 µmol/L (60-110)

Plasma osmolality 260 mosmol/L

Urine osmolality 650 mosmol/L

Urine sodium concentration 38 mmol/L

What agent may be responsible for her presentation?

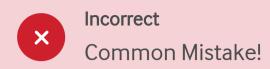
- Lisinopril
- O Lithium
- Metformin
- Fluoxetine
- Pioglitazone

Question navigator

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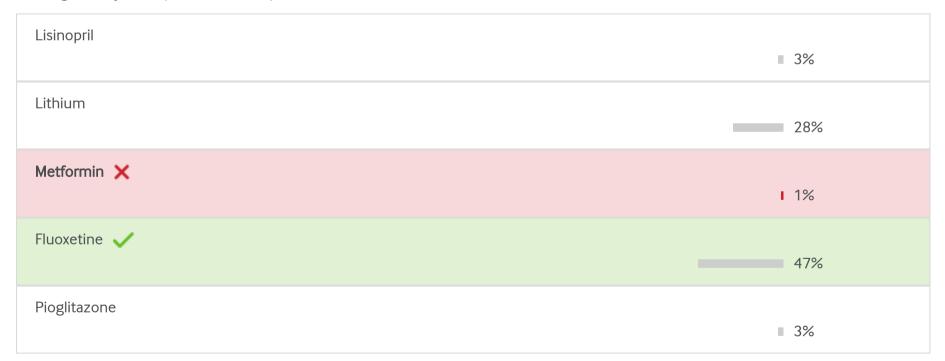
Plasma osmolality 260 mosmol/L

Urine osmolality 650 mosmol/L

,

Urine sodium concentration 38 mmol/L

What agent may be responsible for her presentation?



Key learning points $\, \, \mathbb{Q} \,$

Emergency Medicine, Endocrinology, Psychiatry, Therapeutics

• Drugs that may cause SIADH include Selective serotonin reuptake inhibitors (SSRIs), Tricyclic antidepressants, Sulphonylureas, Thiazides, and Carbamazepine.

Explanation

This patient has <u>syndrome of inappropriate antidiuretic hormone</u> (SIADH) as suggested by the <u>hyponatraemia</u> with high urine sodium and osmolality.

Drugs that may cause SIADH include:

- Selective serotonin reuptake inhibitors (SSRIs) (fluoxetine)
- Tricyclic antidepressants

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- Sulphonylureas
- Thiazides, and
- Carbamazepine.

Other causes of SIADH include:

- Pneumonias
- Meningitis Guillain-Barré
- Trauma, and
- Malignancy.

Lithium would cause diabetes insipidus (DI).

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Question 40 of 100

A 62-year-old patient with type 1 diabetes presents with hypertension. His blood pressure in clinic is 210/110 mmHg despite treatment with bendroflumethiazide, atenolol and doxazosin.

Investigations demonstrate the following:

Na	136 mmol/L	(135-145)
K	3.5 mmol/L	(3.5-5.0)
Urea	8.9 mmol/L	(3.0-8.0)
Creatinine	132 μmol/L	(70-120)
Urinary metanephrines	Mets 700 nmol/24 hr	(<2000)
	Normets 3277 nmol/24 hour	(<4900)
Urinary free cortisol	250 nmol/L	(<248)
Plasma renin	<0.05 mU/L	(5.4-60 upright)
		(5.4-30 after 1 hour rest)
Aldosterone	1258 pmol/L	(100-450 adults overnight)
		(100-800 random sample/upright)

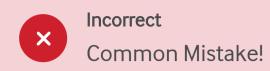
What is the most likely cause of his hypertension?

\circ	Addison's disease
\circ	Chronic renal failure
\circ	Cushing's syndrome
\circ	Conn's syndrome
\bigcirc	Phaeochromocytoma

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		(5.4-30 after 1 hour rest)
Aldosterone	1258 pmol/L	(100-450 adults overnight)
		(100-800 random sample/upright)

What is the most likely cause of his hypertension?

Addison's disease	■ 3%
Chronic renal failure	■ 2%
Cushing's syndrome	
Conn's syndrome	■ 4%
Dhea a chua ma au ta ma	88%
Phaeochromocytoma X	4 %

Endocrinology

• Renin, aldosterone and Conn's syndrome.

Explanation

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Typical features include drug-resistant hypertension, hypokalaemia and responsiveness to aldosterone antagonists such as spironolactone. Many patients are asymptomatic and high-risk groups should be screened with the aldosterone/renin ratio.

Conn's syndrome, or primary hyperaldosteronism, is now recognised as a common secondary cause of hypertension.

Consider testing patients with:

- Stage 1 hypertension (>160-179/100-109 mmHg)
- Stage 2 hypertension (>180/110 mmHg)
- Drug resistant hypertension
- Hypertension and spontaneous or diuretic-induced hypokalaemia
- Hypertension with adrenal incidentaloma
- Hypertension and a family history of early onset hypertension or cerebrovascular accident at a young age (less than 40-years-old), and
- Hypertensive first-degree relatives of patients with primary hyperaldosteronism.

Pathologically, primary hyperaldosteronism is often associated with adrenal hyperplasia or nodules.

Patients with a positive aldosterone/renin ratio (ARR) should be further investigated using CT scanning, adrenal vein sampling or genetic testing where appropriate. Unilateral disease may be suitable for surgery.

CT scanning is recommended in all patients to exclude malignant adrenal carcinoma and to localise any non-malignant abnormalities. Where there is doubt about the location of the lesion, adrenal vein sampling can identify where the excess hormone is originating.

In young patients (less than 20-years-old) or those with a family history, genetic screening should be considered for glucocorticoid remediable aldosteronsim.

Further Reading:

Funder JW, et al. <u>Case detection, diagnosis, and treatment of patients with primary aldosteronism: an endocrine society clinical practice guideline.</u> *J Clin Endocrinol Metab.* 2008;93:3266-81.

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☆ High impact question

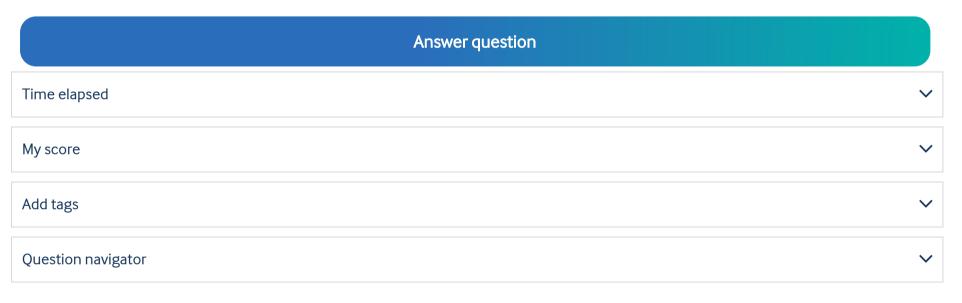
A 48-year-old man with type 2 diabetes takes a twice daily pre-mixed insulin (NovoMix 30).

He has returned for diabetic review at the surgery and has brought his recent blood sugar readings. He tests 4 times a day: pre-breakfast, pre-lunch, pre-evening meal, and pre-bed.

Pre-breakfast glucose readings are between 5.0 and 6.0 mmol/L; pre-lunch readings are between 8 and 11 mmol/L; pre-evening meal readings are between 8 and 10 mmol/L; and pre-bed readings are between 6.0 and 8.0 mmol/L.

Which of the following is correct in this instance?

- O The morning dose of insulin should be reduced
- O The insulin doses do not need to be adjusted
- O The evening dose of insulin should be reduced
- O The morning dose of insulin should be increased
- O The evening dose of insulin should be increased



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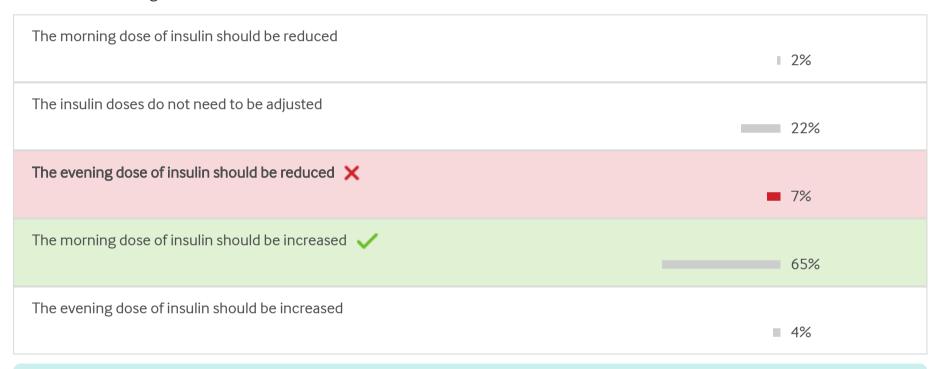
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Which of the following is correct in this instance?



Key learning points 🛭

Diabetes, Endocrinology

• When considering twice daily pre-mixed insulin: the morning dose is titrated according to the pre-lunch and pre-evening meal blood glucose readings; the evening dose is titrated against the pre-bed and pre-breakfast readings.

Explanation

Blood sugars <6 mmol/L pre-lunch and pre-evening meal are the aim (4 to 7 mmol/L is acceptable). Pre-breakfast sugars should again be between 4 and 7 mmol/L. Pre-bed sugars should be between 6 and 8 mmol/L.

The patient has good pre-breakfast and pre-bed readings but is running a little high pre-lunch and pre-evening meal. As such the morning dose of insulin should be increased.

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Question 42 of 100

A 32-year-old woman presents with a two month history of weight loss and increasing agitation. On examination she is noted to have a smooth goitre, a fine tremor of the outstretched hand and a pulse of 98 beats per minute.

Investigations reveal:

Free T4	42.6 pmol/L	(10-22)
Free T3	12.1 pmol/L	(5-10)
TSH	<0.02 mU/L	(0.4-5)
Haemoglobin	128 g/L	(115-165)
White cell count	8.2 ×10 ⁹ /L	(4-11)
Neutrophil count	5.5 ×10 ⁹ /L	(1.5-7)

She is commenced on carbimazole 40 mg daily and informed of the potential side effects of treatment. A further appointment was arranged for two months. However, she re-presents three weeks later with a sore throat.

Investigations reveal:

Free T4 29.9 pmol/L (10-22)

Free T3 8.2 pmol/L (5-10)

TSH <0.02 mU/L (0.4-5)

Haemoglobin 130 g/L (115-165)

White cell count 5.5 × 10⁹/L (4-11)

Neutrophil count 2.1 × 10⁹/L (1.5-7)

What is the most appropriate next step in this patient's management?

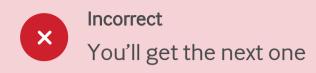
Stop carbimazole and treat with G-CSF
 Stop carbimazole
 Stop carbimazole and treat with radio-iodine
 Reassure and continue carbimazole
 Switch carbimazole to propylthiouracil

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Investigations reveal:

Free T4 42.6 pmol/L (10-22)

Free T3 12.1 pmol/L (5-10)

TSH <0.02 mU/L (0.4-5)

Haemoglobin 128 g/L (115-165)

White cell count 8.2×10^9 /L (4-11)

Neutrophil count 5.5×10^9 /L (1.5-7)

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Haemoglobin 130 g/L (115-165)

White cell count 5.5 × 10⁹/L (4-11)

Neutrophil count 2.1 × 10⁹/L (1.5-7)

What is the most appropriate next step in this patient's management?

Stop carbimazole and treat with G-CSF

Stop carbimazole

4%

Stop carbimazole and treat with radio-iodine

4%

Reassure and continue carbimazole

79%

Switch carbimazole to propylthiouracil

Endocrinology, Pharmacology

• Agranulocytosis occurs in less than 1% of patients taking thionamides

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Explanation

Patients are often warned that should they develop a sore throat whilst taking any thionamide then they should seek medical attention.

Yet agranulocytosis is rare, occurring in less than 1% of cases and sore throats are very common. It is not uncommon to see a drop in WCC associated with thionamides, but this patient's WCC and neutrophil counts are normal.

The carbimazole is effectively treating her hyperthyroidism and consequently she should be reassured and the carbimazole continued.

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BMJ On Exam

English French

Question 43 of 100

A 15-year-old female presents with a six month history of secondary amenorrhoea. She has been otherwise well and has also noticed slight galactorrhoea over the last three months.

She had menarche at the age of 12 and has otherwise had regular periods. She has been sexually active for approximately one year and has occasionally used condoms for contraception. She smokes five cigarettes daily and occasionally smokes cannabis.

On examination she appears well, appears clinically euthyroid, has a pulse of 70 bpm and a blood pressure of 112/70 mmHg.

Investigations show:

Serum oestradiol	130 nmol/L	(130-600)
Serum LH	4.5 mU/L	(2-20)
Serum FSH	2.2 mU/L	(2-20)
Serum prolactin	6340 mU/L	(50-450)
Free T4	7.2 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5.0)

What is the most likely diagnosis?

Prolactinoma

- Non-functional pituitary tumour
- O Polycystic ovarian syndrome
- Drug induced
- Pregnancy

 \bigcirc

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9/10/24, 10:31 AM

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A 15-year-old female presents with a six month history of secondary amenorrhoea. She has been otherwise well and has also noticed slight galactorrhoea over the last three months.

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Serum FSH	2.2 mU/L	(2-20)
Serum prolactin	6340 mU/L	(50-450)
Free T4	7.2 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5.0)

What is the most likely diagnosis?





• Prolactin above 2000 mU/L is suggestive of prolatinoma

Explanation

This girl has hyperprolactinaemia and, in general, a prolactin above 2000 mU/L is suggestive of a <u>prolactinoma</u> rather than a non-functioning tumour with stalk compression. Other causes of raised prolactin can be due to physiological stresses, such as post seizures.

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Although hyperprolactinaemia is a feature, this is not pregnancy as elevated oestradiol concentrations would accompany the hyperprolactinaemia.

Subclinical hypothyroidism is associated with hyperprolactinaemia

This level of hyperprolactinaemia would not be found in polycystic ovarian syndrome as concentrations are below 1000 and the oestradiol concentrations are high normal.

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BMJ On Exam

English French

Question 44 of 100

★ High impact question

A 67-year-old woman presents to the diabetes clinic. She has recently sustained a left Colles fracture and you suspect underlying osteoporosis.

Current medication includes metformin, pioglitazone, BD mixed insulin, ramipril, indapamide and amlodipine.

On examination her BP is 145/72 mmHg, pulse is 78 and regular. Her BMI is 32.

Investigations show:

Hb 129 g/L (115-160) WCC $6.2 \times 10^9 / L$ (4-11)188 ×10⁹/L PLT (150-400)Na 137 mmol/L (135-146) 4.9 mmol/L Κ (3.5-5.0)123 μmol/L Cr (79-118) Ca 2.56 mmol/L (2.20-2.61)

Which of her medications is most likely to be linked to risk of osteoporotic fracture?

PioglitazoneRamiprilInsulinMetformin

Indapamide

 \bigcirc

Answer question

Time elapsed

My score

Add tags

Question navigator

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BMJ On Exam

English French



★ High impact question

A 67-year-old woman presents to the diabetes clinic. She has recently sustained a left Colles fracture and you suspect underlying osteoporosis.

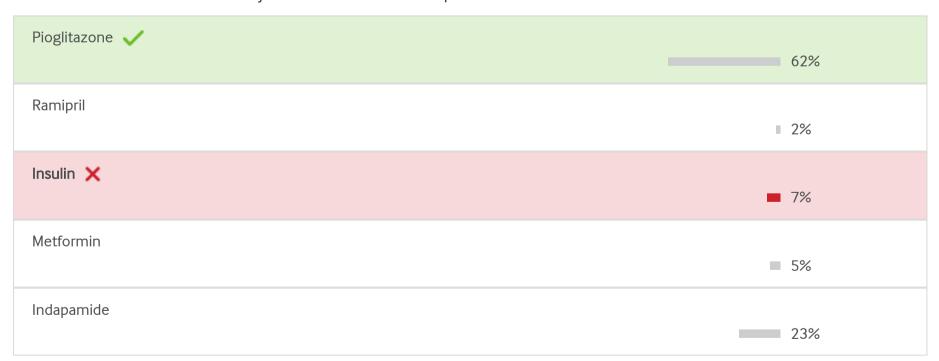
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Investigations show:

Hb	129 g/L	(115-160)
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PLT	188 ×10 ⁹ /L	(150-400)
Na	137 mmol/L	(135-146)
K	4.9 mmol/L	(3.5-5.0)
Cr	123 μmol/L	(79-118)
Ca	2.56 mmol/l	(2.20-2.61)

Which of her medications is most likely to be linked to risk of osteoporotic fracture?



Endocrinology

• It is recognised that long term use of glitazone therapy increases the risk of osteoporotic fracture. (for example pioglitazone or rosiglitazone)

Explanation

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It is recognised that long term use of glitazone therapy increases the risk of osteoporotic fracture. Data on both pioglitazone and the now withdrawn rosiglitazone showed an increased risk of fractures and animal models suggest this is due to reduced bone mineral density. The underlying mechanism is thought to be due to bone cell precursors differentiating into adipocytes rather than osteoblasts.

Data from the ADOPT study with rosiglitazone suggested that the rate of fracture is intermediate between that of patients treated with a sulphonylurea and a glitazone or metformin.

Insulin and ramipril are not known to be associated with increased risk of fracture.

Thiazides such as indapamide reduce calcium excretion and as such do not lead to increased osteoporosis risk.

Next question

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BMJ On Exam

English French

Question 45 of 100

A 28-year-old female presents with recurrent vulval candidiasis.

She has gained approximately 20 kg in weight since the birth of her last child five years ago. During this pregnancy she recalls that she received insulin for approximately four months although this was discontinued after the birth of her daughter who is quite well. She also has two older children who are well although she did not receive insulin during those pregnancies.

She is a smoker of 12 cigarettes per day and drinks approximately 12 units of alcohol weekly.

There is a strong family history of coronary artery disease; her father and paternal uncle both died in their fifties of heart disease. Her mother has diabetes and takes thyroxine for a thyroid problem.

On examination she weighs 90 kg with a body mass index of 36.5 kg/m². Her pulse is regular, 82 beats/minute and her blood pressure is 140/88 mmHg. Otherwise examination of the heart, chest and abdomen is unremarkable.

Fundal examination reveals three dot haemorrhages in the left and two dot haemorrhages in the right retina. There are no abnormalities of sensation in the feet or hands. Peripheral pulses are all normal.

Investigations reveal:

HbA _{1c}	66 mmol/mol	(20-46)
	8.2%	(3.8-6.4)
Fasting plasma glucose	10.3 mmol/L	(3.0-6.0)
Serum urea	5.1 mmol/L	(2.5-7.5)
Serum creatinine	108 μmol/L	(60-110)
Serum alkaline phosphatase	100 U/L	(45-105)
Serum HDL cholesterol	0.8 mmol/L	(>1.55)
Serum total cholesterol	7.2 mmol/L	(<5.2)
Fasting serum triglyceride	2.8 mmol/L	(0.45-1.69)

In addition to lifestyle advice, which of the following treatments should this patient receive?

\bigcirc	Pioglitazone
\bigcirc	Metformin
\circ	Sitagliptin

Insulin

 \bigcirc

Gliclazide

Time elapsed My score

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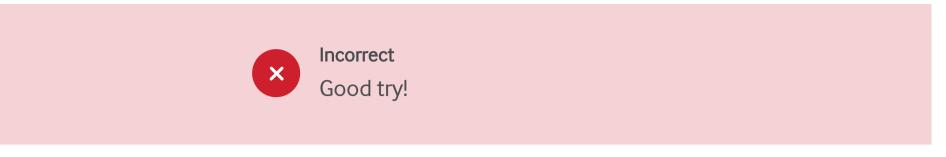
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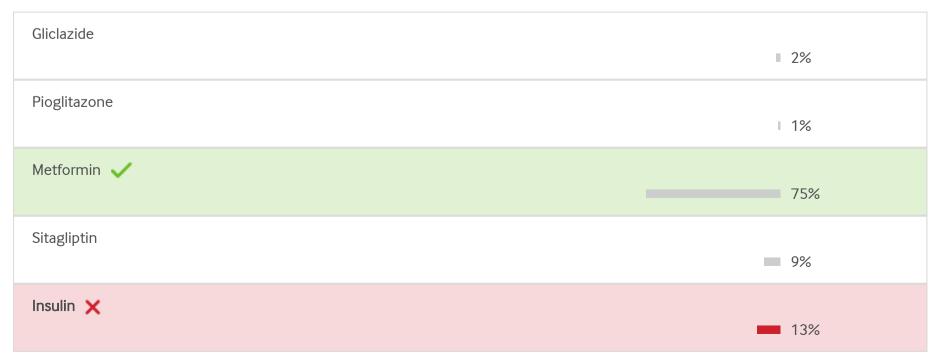
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Serum total cholesterol	7.2 mmol/L	(<5.2)
Fasting serum triglyceride	2.8 mmol/L	(0.45-1.69)

In addition to lifestyle advice, which of the following treatments should this patient receive?



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Diabetes

Metformin is first line treatment of T2 DM

Explanation

This patient typifies the younger obese person with type 2 diabetes and should initially be treated with lifestyle and dietary advice and metformin (if not contraindicated).

This approach should be adopted for at least two-three months prior to considering the introduction of additional therapy. Should this approach fail, then additional therapy such as sulphonylurea or basal insulin should be considered.

Pioglitazone (thiazolidinedione) or sitagliptin (DPP-4 inhibitor) are not recommended as first line therapy but as second- or third-line therapy.

Although the patient was treated with insulin during her pregnancy implying that she had gestational diabetes, this would not be considered at this stage. Similarly, the sulphonylurea, gliclazide, may induce weight gain and is not the most appropriate drug for her unless metformin is contraindicated or the blood glucose higher (for example, 15 mmol/L)

GLP-1 analogues (for example, exenatide or liraglutide) may be used in addition to oral antidiabetic agents as these therapies can result in weight loss which would be useful in this patient.

The deranged lipid profile is typical of T2DM and frequently improves with diet, weight loss and exercise. Metformin may also have a beneficial effect on lipids. However, in view of her multiple cardiovascular risk factors she should be considered for statin and possibly aspirin cardioprotection. Aspirin is generally started in female diabetes patients when older than 60 or above with an additional CVD risk factor, but this lady already has moderate obesity, diabetes, hypertension, microvascular complications, is a current smoker and a strong family history of heart disease.

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Question 46 of 100

A 45-year-old male with diabetes was seen at the diabetic clinic for annual review.

He had had diabetes for eight years and attended clinic regularly. He was also being treated for hypertension and was taking metformin 500 mg tds, gliclazide 80 mg daily, atorvastatin 10 mg/d, ramipril 10 mg/d and bendroflumethiazide 2.5 mg/d.

He was noted to be obese (130 kg) with striae in the abdomen. Physical examination was otherwise unremarkable.

Investigations reveal:

HbA _{1c}	65 mmol/mol	(20-46)
	8.1%	(3.8-6.4)
Fasting glucose	9 mmol/L	(3.0-6.0)
24hr Urine free cortisol	354 mmol/day	(<250)
9am Plasma ACTH	4 ng/dL	(10-50)
CT abdomen	3 cm right adren	al mass

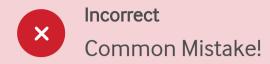
What is the adrenal mass?

- O Cortisol secreting adenoma
- O Ectopic CRF producing phaeochromocytoma
- Incidentaloma
- Metastasis
- Aldosterone secreting adenoma

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24hr Urine free cortisol	354 mmol/day	(<250)
9am Plasma ACTH	4 ng/dL	(10-50)
CT abdomen	3 cm right adren	al mass

What is the adrenal mass?



Key learning points 🛭

Endocrinology

• Raised urinary cortisol with suppressed ACTH is indicative of Cushing's syndrome with adrenal source.

Explanation

The patient is likely to have Cushing's syndrome as suggested by the elevated urine free cortisol, obesity and striae.

The low adrenocorticotropic hormone plus adrenal mass on CT would suggest that this is due to a functional adrenal adenoma.

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BMJ On Exam

English French

Question 47 of 100

This patient presents with sudden onset of frontal headache, diplopia and vomiting.

Examination reveals the appearances of the eyes as shown below:



There is also constriction of the temporal visual fields bilaterally, and sensory loss over the upper maxillae bilaterally.

Investigations reveal:

Sodium	128 mmol/L	(137-144)
Potassium	4.2 mmol/L	(3.5-4.9)
Urea	4.2 mmol/L	(2.5-7.5)
Creatinine	67 μmol/L	(60-110)
Plasma glucose	3.8 mmol/L	(3.0-6.0)

Which of the following diagnoses is most likely?

- O Lateral medullary syndrome
- O Weber's syndrome
- Pituitary apoplexy
- Meningitis
- O Anterior communicating artery aneurysm rupture

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



This patient presents with sudden onset of frontal headache, diplopia and vomiting.

Examination reveals the appearances of the eyes as shown below:

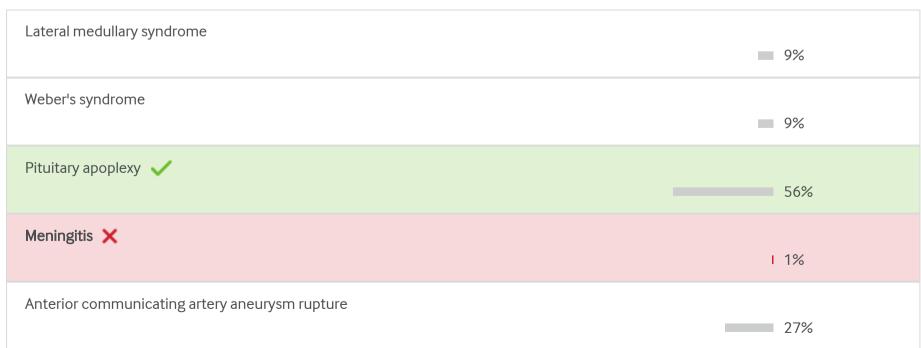


There is also constriction of the temporal visual fields bilaterally, and sensory loss over the upper maxillae bilaterally.

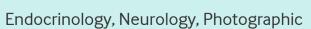
Investigations reveal:

Sodium	128 mmol/L	(137-144)
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Creatinine	67 μmol/L	(60-110)
Plasma glucose	3.8 mmol/L	(3.0-6.0)

Which of the following diagnoses is most likely?



Key learning points $\, \, \mathbb{Q} \,$



• Pituitary apoplexy can cause compression of the occular nerves and trigeminal nerve within the cavernous sinus.

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Explanation

This patient has a sudden onset headache and features of a cavernous sinus compression (i.e. third and fifth nerve palsy. The patient's left eye has ptosis and hence the clinician is pulling up the eyelid to examine the eye, which shows a dilated pupil. The bilateral numbness over the maxillae indicates involvement of the trigeminal nerve). However compression of the chiasm as suggested by the bitemporal hemianopia. This suggests a diagnosis of pituitary apoplexy.

Apoplexy is a haemorrhage or infarction of the pituitary. The expanding mass can compress the cavernous sinus with the Ocular nerves and the trigeminal nerve can also be affected.

The mild <u>hyponatraemia</u> may be a consequence of the either <u>syndrome of inappropriate antidiuretic hormone</u> (SIADH) or secondary hypoadrenalism.

Pituitary apoplexy usually occurs in a pre-existent pituitary tumour which may be entirely asymptomatic before presentation.

Weber's syndrome is a mid brain stroke with ipsilateral third nerve palsy and contralateral hemiplegia.

Most anterior artery communicating aneurysms are asymptomatic unless they rupture, and so they are usually found either incidentally or when a patient presents with SAH. Some unruptured aneurysms can become symptomatic. Symptoms include headache (which may be severe and comparable to the headache of SAH), visual acuity loss, cranial neuropathies (particularly third nerve palsy), pyramidal tract dysfunction, and facial pain; they are felt to be due to the mass effect of the aneurysm. However they would not present with a bitemporal hemianopia as with this patient.

Wallenberg's syndrome, or lateral medullary syndrome, is due to infarction of the posterior inferior cerebellar artery resulting in ipsilateral V, IX, X nerve involvement, dissociated sensory loss and ataxia.

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Question 48 of 100

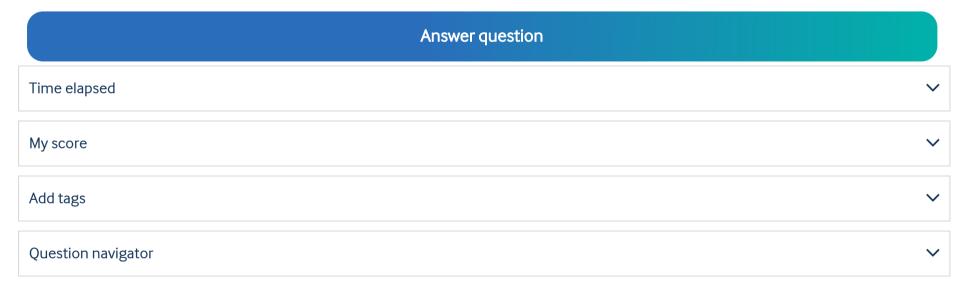
★ High impact question

A 52-year-old woman is referred by an orthopaedic surgeon for advice following a Colles' fracture eight weeks ago. At the time of her fracture, the radiologist had reported 'significant osteopaenia'. A dual-energy x ray absorptiometry (DEXA) scan was carried out and her T score was -2.6 at the hip and -1.9 at the lumbar spine.

She smokes approximately 15 cigarettes per day and has a body mass index of 21 kg/m². She has been post-menopausal for two years, is unaware of any menopausal symptoms and has had a benign breast lump removed 18 months ago. She is currently taking aspirin, atenolol and glyceryl trinitrate (GTN) spray for her angina, which she uses only occasionally.

What would be the most appropriate treatment?

\circ	Calcium and vitamin D supplements
\bigcirc	Alendronate
\bigcirc	Raloxifene
\bigcirc	Hormone replacement therapy
\circ	Calcitonin



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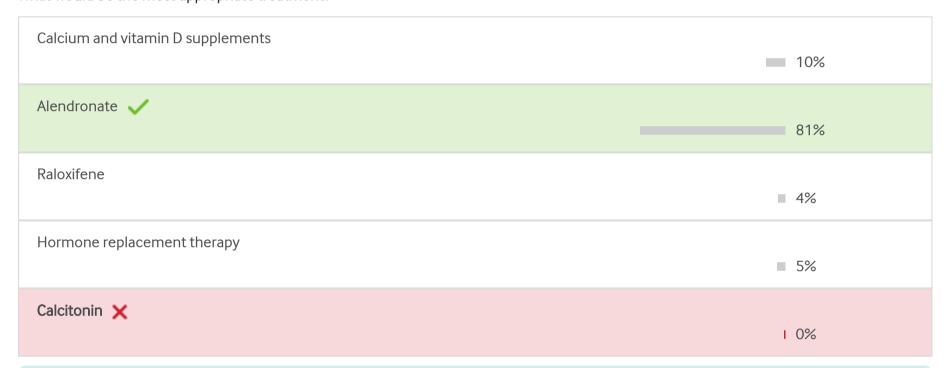


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What would be the most appropriate treatment?



Key learning points 🛭

Emergency Medicine, Endocrinology, Pharmacology

• Bisphosphonates are the drug of choice in established osteoporosis

Explanation

Bisphosphonates (for example, alendronate and risedronate) act as a potent inhibitors of bone resorption by decreasing osteoclast recruitment, activity, and life span. Treatment with bisphosphonates has been shown to increase bone mineral density (BMD) significantly in osteoporotic patients and thus reduce fractures. Problems with adverse effects (mainly GI upset) can be reduced by a weekly administration of bisphosphonates. It is the drug of choice for treatment of osteoporosis.

Calcium and vitamin D supplements are more likely to benefit women who are more than five years post menopause, as their intake is likely to be low. Post menopausal women who wish to reduce the risk of osteoporosis should consume 1000-1500 mg of elemental calcium and 400-800 IU of vitamin D daily, ideally through calcium containing foods. Excessive intake of calcium and vitamin D may cause adverse effects such as hypercalcaemia and hypercalciuria.

The use of hormone replacement therapy (HRT) is controversial and should be reserved for those with menopausal symptoms and without overt cardiovascular disease, as studies suggest increased cardiovascular risk although it is still a good agent in preventing fractures.

Reference:

1. Beral V. <u>Breast cancer and hormone-replacement therapy in the Million Women Study</u>. *Lancet.* 2003;362:419-27.

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2. NICE. <u>Alendronate, etidronate, risedronate, raloxifene and strontium ranelate for the primary prevention of osteoporotic fragility fractures in postmenopausal women (TA160).</u>

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English French

Question 49 of 100

This 20-year-old man is referred to the clinic by his GP with vague chest pains.



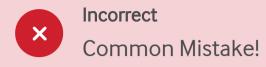
What is the diagnosis?

- O Type II(A) hyperlipidaemia
- O Type III hyperlipidaemia
- O Type I hyperlipidaemia
- O Type IV hyperlipidaemia
- O Type II(B) hyperlipidaemia

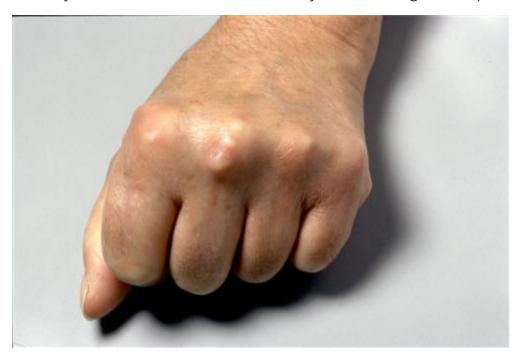
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English French

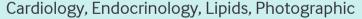


This 20-year-old man is referred to the clinic by his GP with vague chest pains.



What is the diagnosis?

Type II(A) hyperlipidaemia 🗸	22%
Type III hyperlipidaemia	37%
Type I hyperlipidaemia	10%
Type IV hyperlipidaemia 🗶	15%
Type II(B) hyperlipidaemia	17%



• Tendinous xanthomata is pathognomonic for type II(a) hyperlipidaemia (familial hypercholesterolaemia)

Explanation

This picture shows tendinous xanthomata which are virtually pathognomonic of familial hypercholesterolaemia.

Tendon xanthomata commonly affect the Achilles tendons and the tendons overlying the metacarpophalangeal (MCP) joints in the hands. Less common sites include the extensor hallucis longus and triceps tendons. Histologically, the xanthomata consist of accumulations of cholesterol deep within the tendon with associated fibrous tissue. The skin overlying the lesion is usually normal, although if there is inflammation in the tendon, there may be overlying erythema.

This is an autosomal dominant disorder of chromosome 19 causing a mutation in the LDL receptor. There are homozygous and heterozygous forms. Heterozygosity occurs in one in 500 people. Homozygosity is much rarer and is associated with earlier onset of premature vascular disease, even in childhood.

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It is defined in the WHO classification as a type IIa hyperlipidaemia.

Further Reading:

- 1. Fredrickson DS, Lees RS. <u>A System for Phenotyping Hyperlipoproteinemia</u>. *Circulation*. 1965;31:321-7.
- $2.\,GP\,Notebook.\,\underline{WHO\,/\,Fredrickson\,Classification\,of\,Primary\,Hyperlipidaemias.}\\$

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BMJ On Exam

English French

Question 50 of 100

A 52-year-old male presents with a six month history of weight loss and thirst.

He has a past history of hypertension for which he takes bendroflumethiazide and ramipril. Otherwise he has been well. He has lost approximately 4 kg in weight over this time and finds that he needs to get up in the night to pass urine twice.

On examination, his pulse is 80 bpm regular, his blood pressure is 138/84 mmHg and he has BMI of 23.5 kg/m². Dipstick urine analysis reveals ++ glucose.

His investigations reveal:

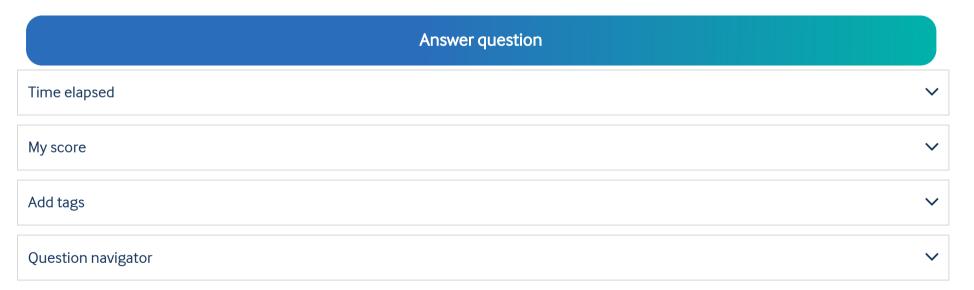
Fasting plasma glucose 13.3 mmol/L (3.5-6)

HbA_{1c} 74 mmol/mol (20-46)

8.9% (<6)

Which of the following is the most appropriate investigation in determining the aetiology of this patient's diabetes?

- O Insulin autoantibodies
- HLA typing
- O Glutamic acid decarboxylase (GAD) antibodies
- Urine free cortisol measurement
- O Tryptophan hydroxylase autoantibodies



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English French



A 52-year-old male presents with a six month history of weight loss and thirst.

He has a past history of hypertension for which he takes bendroflumethiazide and ramipril. Otherwise he has been well. He has lost approximately 4 kg in weight over this time and finds that he needs to get up in the night to pass urine twice.

On examination, his pulse is 80 bpm regular, his blood pressure is 138/84 mmHg and he has BMI of 23.5 kg/m². Dipstick urine analysis reveals ++ glucose.

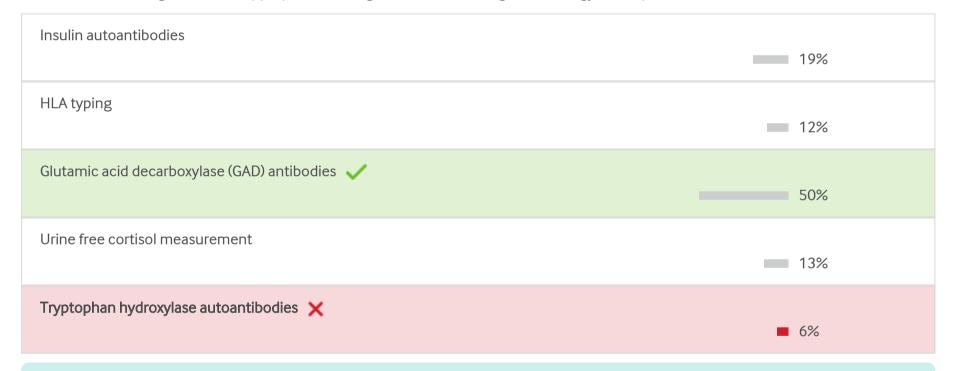
His investigations reveal:

Fasting plasma glucose 13.3 mmol/L (3.5-6)

HbA_{1c} 74 mmol/mol (20-46)

8.9% (<6)

Which of the following is the most appropriate investigation in determining the aetiology of this patient's diabetes?



Key learning points 🛭

Diabetes

• 70-90% of people with T1 diabetes will have anti-GAD antibodies

Explanation

This patient has diabetes mellitus and in view of the weight loss, non-obese, and osmotic symptoms is likely to be insulinopenic - type 1.

The presence of GAD autoantibodies would signify an autoimmune aetiology and their presence signifies a ten fold increased risk of developing insulin-dependent diabetes mellitus, being found in 70-90% of type1 diabetics. This would be a case of latent autoimmune diabetes in adults (LADA) and constitutes approximately 10% of patients incorrectly labelled as type 2 diabetic.

Also, one might encounter a high prevalence of islet cell autoantibodies in type 1 diabetes.

Insulin antibodies are found almost exclusively in young children with type 1 diabetes.

Tryptophan hydroxylase autoantibodies may be found in autoimmune polyendocrine syndrome associated with an autoimmune malabsorption.

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Discussion points:

- What HLA types are associated with both T2 and T1 DM?
- What other antibodies may be measured in T2DM and what is their value in predicting the development of diabetes?
- For what other conditions is the measurement of GAD important?
- What is the proportion of type 2s that have anti-GAD antibodies and what would this suggest?

Reference:

Ellis TM, Atkinson MA. <u>The clinical significance of an autoimmune response against glutamic acid decarboxylase.</u> *Nat Med.* 1996;2:148-53.

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BMJ On Exam

English French

Question 51 of 100

A 20-year-old student presents with weight gain and depression.

Six months ago she commenced university. Three months ago she presented to the dermatologists with deteriorating facial acne. She was treated with topical tetracycline and noted some improvement in the acne. However, over the last three months has become more depressed, finds class work difficult and has physical difficulty getting out of her bed in the mornings. She is also concerned that she has gained approximately 5 kg in weight over this time and has noted some problem with menstrual irregularity.

On examination she had mild facial acne, a blood pressure of 128/86 mmHg and had a BMI of 32.1 kg/m².

Investigations revealed:

Full blood count	Normal	-
Glucose	5.6 mmol/L	(3.0-6.0)
Urea and electrolytes	Normal	-
Oestradiol	100 pmol/L	(>130)
LH	8.4	(1-10)
FSH	3.4	(1-10)

What is the most appropriate step in the management of this patient?

Refer for psychiatric opinionPregnancy test

Ovarian ultrasound

- O Urine free cortisol measurement
- O CT head scan

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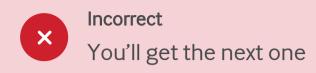
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BMJ On Exam

English French



A 20-year-old student presents with weight gain and depression.

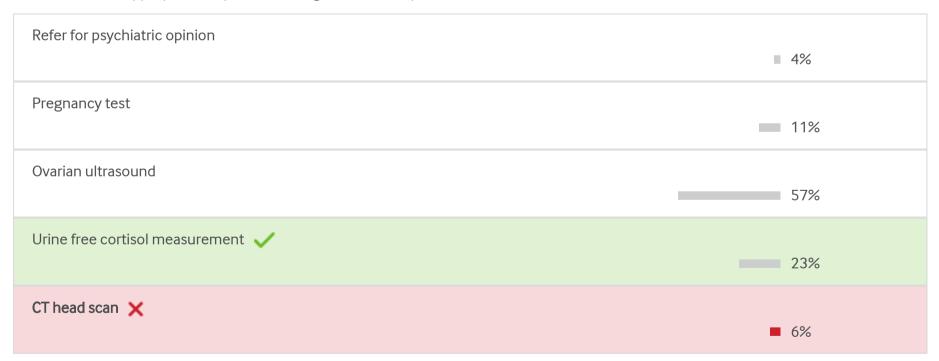
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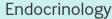
On examination she had mild facial acne, a blood pressure of 128/86 mmHg and had a BMI of 32.1 kg/m².

Investigations revealed:

Full blood count	Normal	-
Glucose	5.6 mmol/L	(3.0-6.0)
Urea and electrolytes	Normal	-
Oestradiol	100 pmol/L	(>130)
LH	8.4	(1-10)
FSH	3.4	(1-10)

What is the most appropriate step in the management of this patient?





• Cushings is associated with acne, weight gain and mood disturbance, with dysmenorrhoea and low oestrodiol.

Explanation

The relevant points in this woman's history are the depression, acne, weight gain and difficulty rising from bed.

These would suggest a diagnosis of Cushing's disease.

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Polycystic ovarian syndrome (PCOS) is unlikely as her oestradiol concentration is low; typically in PCOS oestradiol is normal or elevated and a low oestradiol would be in keeping with Cushing's.

The low oestradiol also excludes pregnancy.

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BMJ On Exam

English French

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Question 52 of 100

A 28-year-old female presents with a three month history of deteriorating coordination.

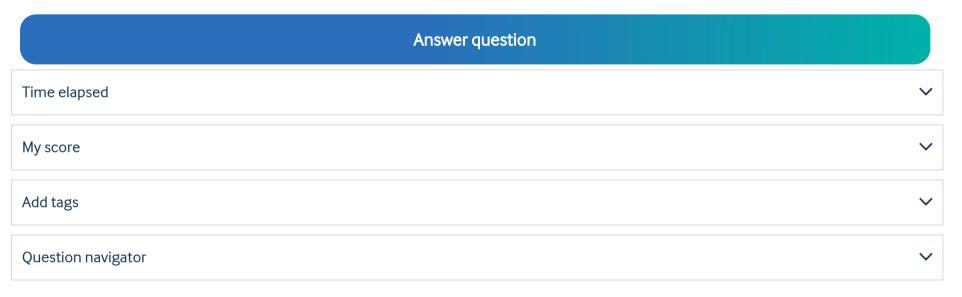
Examination reveals a blood pressure of 124/74 mmHg, and the only abnormalities of note are right sided dysdiadokinesis with nystagmus and a tendency to fall to the right. You also notice a number of café-au-lait spots.

Which of the potential causes below would NOT explain her lack of coordination?

\circ	Pituitary	tumour

\bigcirc	Neurofibromatosis type	Ш
$\overline{}$	Neuronbromatosis type	

- Acoustic neuroma
- Cerebellar haemangioblastoma
- O Retinal haemangioblastoma



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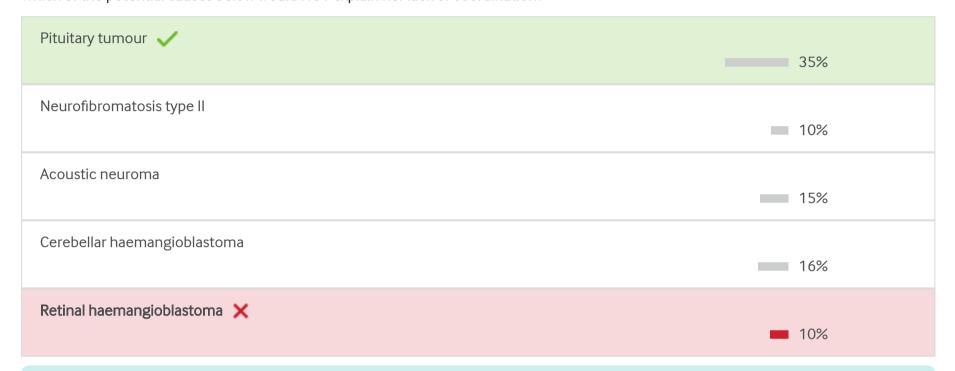
English French

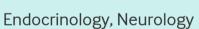


A 28-year-old female presents with a three month history of deteriorating coordination.

Examination reveals a blood pressure of 124/74 mmHg, and the only abnormalities of note are right sided dysdiadokinesis with nystagmus and a tendency to fall to the right. You also notice a number of café-au-lait spots.

Which of the potential causes below would NOT explain her lack of coordination?





• Features of neurofibromatosis Type 2 include cerebellar and retinal haemangioblastomas, café-au-lait spots, and acoustic neuromas.

Explanation

This patient appears to have developed features of cerebellar ataxia.

This, coupled with the skin changes, would suggest a diagnosis of neurofibromatosis Type 2, a condition associated with haemangiomas of the central nervous system (usually retina or cerebellum).

Although a pituitary tumour is a possible, it would not explain the ataxia.

Next question

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English French

Question 53 of 100

A 65-year-old retired teacher presents to the diabetic clinic after her GP found a random blood glucose of 25 mmol/L on a routine check-up.

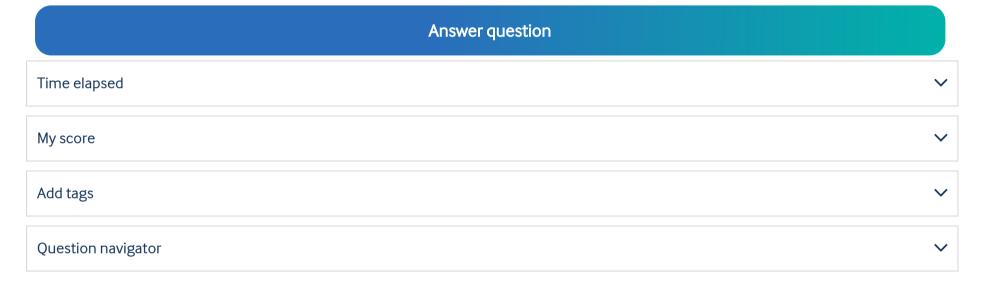
She has had diabetes for 25 years and was previously well controlled on glibenclamide 5 mg bd together with metformin 800 mg TDS. She is currently asymptomatic and suffers from no other medical conditions.

On examination she has stocking distribution sensory neuropathy that is symmetrical, scattered hard exudates and dot blot haemorrhages on fundoscopy.

Her examination is otherwise normal except for a BMI of 32. Her fasting blood glucose on the day of the clinic is 20 mmol/L (3.0-6.0)

What is the best management of this patient?

- O Increase the dose of metformin to 800 mg QDS
- Refer the patient for dietician advice
- O Advise stricter diet and review in two weeks
- O Increase the dose of glibenclamide to 5 mg TDS
- Start the patient on insulin



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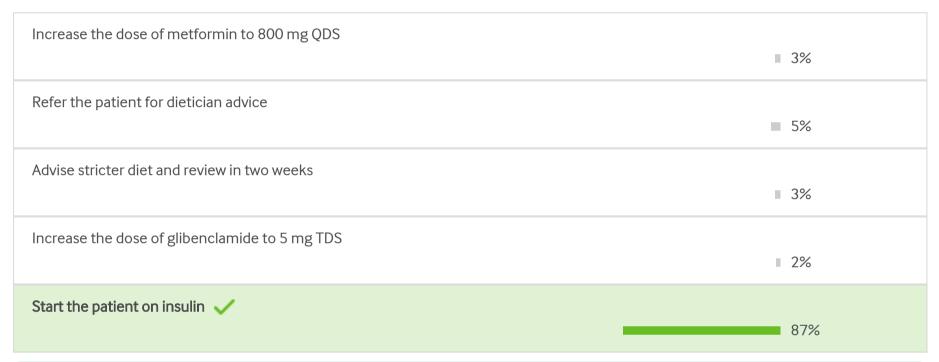
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On examination she has stocking distribution sensory neuropathy that is symmetrical, scattered hard exudates and dot blot haemorrhages on fundoscopy.

Her examination is otherwise normal except for a BMI of 32. Her fasting blood glucose on the day of the clinic is 20 mmol/L (3.0-6.0)

What is the best management of this patient?



Key learning points 🛭



Endocrinology, Pharmacology

• Revise NICE guidance on type 2 diabetes and the introduction of insulin

Explanation

This is a classical history of a patient who has arrived to a stage where oral hypoglycaemic agents (OHAs) can no longer achieve normoglycaemia.

She was previously well controlled on OHAs and this suggests that she already was following an adequate diabetic diet.

Secretagoges such as the sulphonylureas, the thiazolidinediones, nateglinide and repaglinide, will not be effective in the patient's case as her pancreas cannot secrete more insulin.

In this scenario starting insulin immediately would be the best choice.

Next question

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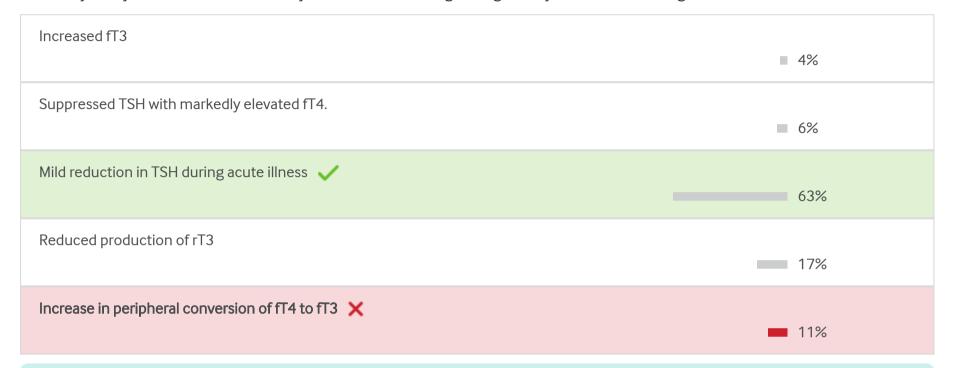
English French Question 54 of 100 Sick euthyroid syndrome is characterised by which of the following findings on thyroid function testing (TFT)? \bigcirc Increased fT3 \bigcirc Suppressed TSH with markedly elevated fT4. \bigcirc Mild reduction in TSH during acute illness \bigcirc Reduced production of rT3 \bigcirc Increase in peripheral conversion of fT4 to fT3 Answer question Time elapsed My score Add tags

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English French



Sick euthyroid syndrome is characterised by which of the following findings on thyroid function testing (TFT)?



Key learning points 🛭



Endocrinology

• Thyroid disease and non-thyroidal illness, TFT interpretation.

Explanation

Sick euthyroid syndrome, or non-thyroidal illness, refers to alterations in thyroid function and thyroxine function during significant illness.

It is a very variable condition and many different pictures can been seen on thyroid testing. For this reason, it is often very difficult to interpret TFTs during intercurrent illness. Usually no treatment is required, except to treat the underlying disease process.

Typically:

- Thyroid-stimulating hormone (TSH) decreases during the acute phase of the illness and increases during recovery.
- Free tri-iodothyronine (fT3) is low due to reduced peripheral conversion of thyroxine (T4) to T3 by deiodinase enzymes. Similar issues can occur in chronic nutritional deficiency, poorly controlled diabetes mellitus and drug treatment with hydrocortisone or beta blockers.
- Reverse T3 (rT3) is made instead of normal T3.
- T4 is often normal or slightly low.
- Thyroid binding proteins.

Next question

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English French

Question 55 of 100

A 44-year-old male attends for a health check at a mobile cardiovascular risk assessment clinic. He takes no medication but leads a sedentary lifestyle. He is a non-smoker and family history reveals that his father had an MI at 60 years of age.

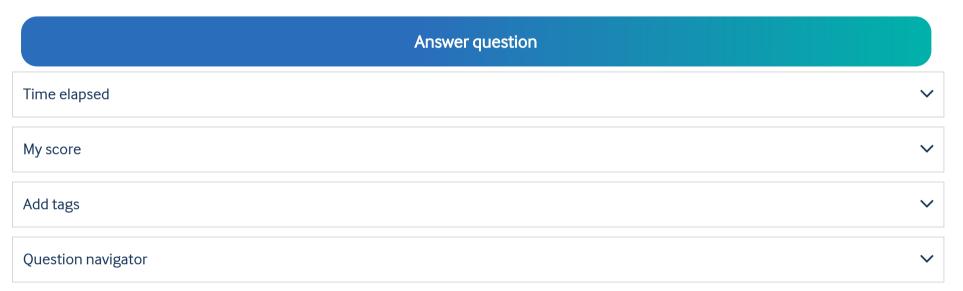
Investigations reveal:

Total cholesterol 5.	.0 mmol/L	(<5.2)
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Triglycerides 4.0 mmol/L (0.45-1.69)

Which of the following is the commonest cause of an isolated hypertriglyceridaemia?

- Drug therapy
- Obesity O
- O Familial hyperlipidaemia
- Alcohol
- O Diabetes mellitus



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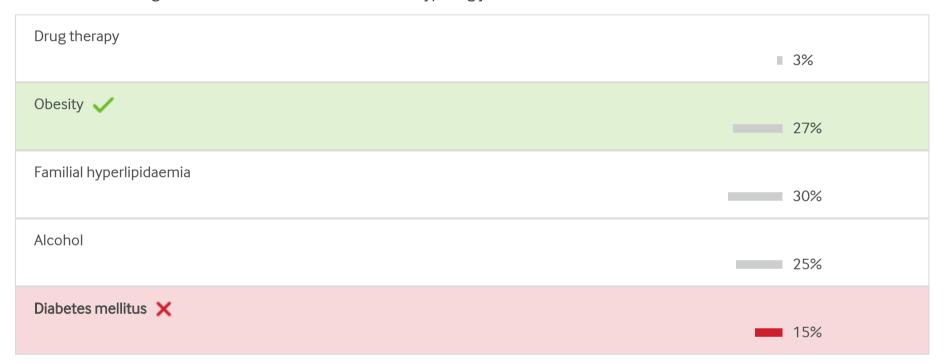
A 44-year-old male attends for a health check at a mobile cardiovascular risk assessment clinic. He takes no medication but leads a sedentary lifestyle. He is a non-smoker and family history reveals that his father had an MI at 60 years of age.

Investigations reveal:

Total cholesterol 5.0 mmol/L (<5.2)

Triglycerides 4.0 mmol/L (0.45-1.69)

Which of the following is the commonest cause of an isolated hypertriglyceridaemia?



Key learning points 🛭



Diabetes, Lipids

• The commonest cause of hypertriglyceridaemia is obesity, and then alcohol.

Explanation

The commonest cause of a mild <u>hypertriglyceridaemia</u> is obesity secondary to a reduced efficacy of lipoprotein lipase activity and overproduction of VLDL.

Obesity (defined as a BMI above 30) is present in approximately 20% of subjects in the UK and rising, hence why it is the commonest cause of hyperlipidaemia. Alcohol is probably a close second.

Other secondary causes of hypertriglyceridaemia include:

- pregnancy
- hypothyroidism
- diuretics, and
- pancreatitis.

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BMJ On Exam

English French

Question 56 of 100

A 55-year-old man with ulcerative colitis has required chronic low dose steroids for the past six months.

Previously he has required several short courses of prednisolone. Other medication includes mesalazine.

On examination his pulse is 80, BP is 122/72; mmHg, and BMI is 21. Physical examination is unremarkable.

Investigations show:

Haemoglobin	127 g/L	(135-177)
White cell count	6.1 ×10 ⁹ /L	(4-11)
Platelets	190 ×10 ⁹ /L	(150-400)
Sodium	141 mmol/L	(135-146)
Potassium	4.0 mmol/L	(3.5-5)
Creatinine	113 μmol/L	(79-118)
Alkaline phosphatase	85 U/L	(39-117)
Calcium	2.3 mmol/L	(2.20-2.61)

Neck of femur T score −1.7

Which of the following is the most appropriate way to manage him with respect to bone protection?

- Alendronate
- O Calcium and vitamin D
- Strontium
- Denosumab
- O Advice about healthy eating and non-smoking

Time elapsed My score Add tags Question navigator

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English French



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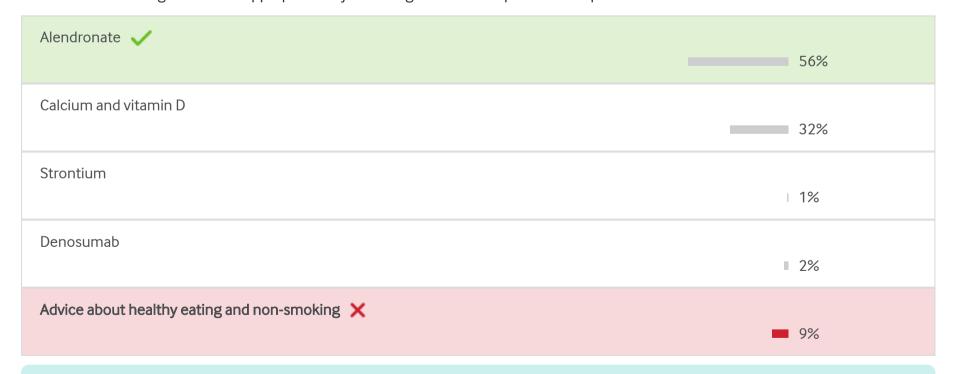
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Alkaline phosphatase	85 U/L	(39-117)
Calcium	2.3 mmol/L	(2.20-2.61)

Neck of femur T score −1.7

Which of the following is the most appropriate way to manage him with respect to bone protection?



Key learning points **Q**



Endocrinology

• Bisphosphonates are first line treatment in osteoporosis provided there are no contraindications and they are tolerated.

Explanation

RCP guidance states that individuals should be given prophylaxis against osteoporosis if they:

• Are under 65 years

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- Require steroids for longer than three months, and
- Have a T score of less than -1.5

The initial treatment of choice is a bisphosphonate. Only if bisphosphonates are not tolerated, would alternatives be considered.

Strontium and denosumab are alternative therapies for <u>osteoporosis</u> where a bisphosphonate is not tolerated.

Calcium and vitamin D and lifestyle advice are not as effective as a bisphosphonate, so are not appropriate choices.

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Question 57 of 100

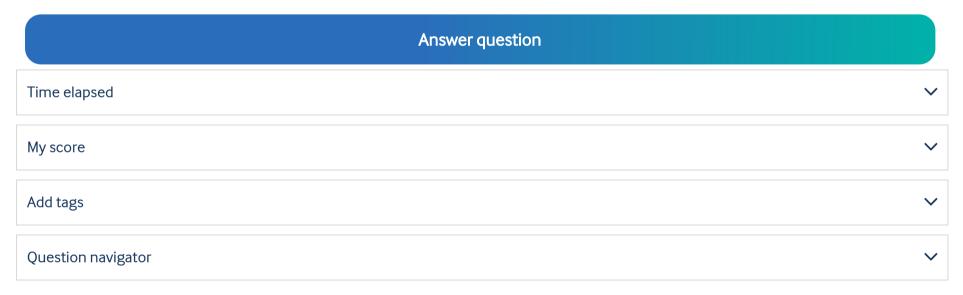
You are reviewing a 70-year-old type 2 diabetic lady. She takes metformin 1g BD and is also on Humulin I taken once daily at night. The insulin was started at her last diabetic review and she has been monitoring her glucose levels at home to aid dose titration.

She tells you that her waking glucose levels at home have been in the range 9-13 mol/L over the last one - two weeks. 9.0 has been the lowest reading she has had.

She is currently taking 20 units of insulin at night.

Which of the following is the most appropriate advice to give with regards her insulin dose?

- O Increase her insulin dose by 2 units
- O Move the insulin dose to the morning
- O Increase her insulin dose by 10 units
- O Increase her insulin dose by 4 units
- O Increase her insulin dose by 20 units



BMJ On Exam

English French



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She is currently taking 20 units of insulin at night.

Which of the following is the most appropriate advice to give with regards her insulin dose?



Key learning points 🛭



Diabetes, Endocrinology

• When up-titrating insulin, increase in steps of 10%

Explanation

Generally, insulin doses are increased in 10% increments. In this case we have a patient on a once daily insulin whose sugars are running above target range. Pre-breakfast glucose readings should ideally be between 4 and 7 mmol/L.

She therefore requires her insulin to be increased. Using the '10% rule' for up-titration of insulin she should add two units to her current dose.

Further monitoring of pre-breakfast glucose levels will guide any further dose adjustments.

Further reading:

NICE Guidlelines: Insulin therapy in type 2 diabetes

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English French

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Question 58 of 100

A 68-year-old male presents with a 6 month history of nocturia. He is diagnosed with type 2 diabetes mellitus based on a fasting plasma glucose concentration of 10.1 mmol/L. His HbA_{1c} is 58 mmol/mol (7.5%) and he has a BMI of 35.2 kg/m².

Which of the following most adequately describes the likely Beta cell mass found in this patient?

- Beta cell mass is normalBeta cell mass is reduced by approximately 20%
- O Beta cell mass is increased by approximately 60%
- O Beta cell mass is increased by approximately 20%
- O Beta cell mass is reduced by approximately 60%

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English French



A 68-year-old male presents with a 6 month history of nocturia. He is diagnosed with type 2 diabetes mellitus based on a fasting plasma glucose concentration of 10.1 mmol/L. His HbA $_{1c}$ is 58 mmol/mol (7.5%) and he has a BMI of 35.2 kg/m 2 .

Which of the following most adequately describes the likely Beta cell mass found in this patient?



Key learning points 🛭



Diabetes

• Beta cell mass is reduced by 65% in Type 2 and 90% in Type 1 diabetic patients

Explanation

Compared with subjects with normoglycaemia, beta cell mass is reduced by 50% in subjects with Impaired Fasting Glucose, by 65% in subjects with Type 2 diabetes, and over 90% in subjects with type 1 diabetes. The suggestion therefore is one of gradual insulin deficiency associated with increasing insulin resistance.

For further revision it can be worth considering:

- What is responsible for the decline in beta cell mass in type 2 diabetes?
- What are the potential mechanisms regarding the reduced beta cell mass?

Further Reading:

Lupi R, Del Prato S. Beta-cell apoptosis in type 2 diabetes: quantitative and functional consequences. Diabetes Metab. 2008;34:S56-6

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English French

Question 59 of 100

A 22-year-old woman presented with a five year history of hirsutism with her having noticed coarse dark hair under her chin. Being a teacher in a primary school, these symptoms are very distressing for her.

She has tried local measures such as shaving and applying depilatory creams but without lasting success. Her periods are irregular with oligomenorrhoea. She attained menarche at the age of 14 years. She has not yet conceived. She takes 5 mg diazepam at night.

On examination, she had a BMI of 26. She had coarse, dark hair over her chin, lower back and inner thighs. She does not have galactorrhoea to expression and there were no other clinical features to suggest Cushing's.

Investigations during the follicular phase showed:

Serum androstenedione	10.1 nmol/L	(0.6-8.8)
Serum dehydroepiandrosterone sulphate	9.6 μmol/L	(2-10)
Serum 17-hydroxyprogesterone	5.6 nmol/L	(1-10)
Serum oestradiol	240 pmol/L	(200-400)
Serum testosterone	3.6 nmol/L	(0.5-3)
Serum sex hormone binding protein	32 nmol/L	(40-137)
Plasma luteinising hormone	4.8 U/L	(2.5-10)
Plasma follicle-stimulating hormone	2.5 U/L	(2.5-10)
Plasma prolactin	380 mU/L	(<360)

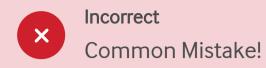
What is the most appropriate treatment for her hirsutism and her underlying condition?

Clomiphene
 Metformin
 Cabergoline
 Bromocriptine
 Oral contraceptive pill (OCP)

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



A 22-year-old woman presented with a five year history of hirsutism with her having noticed coarse dark hair under her chin. Being a teacher in a primary school, these symptoms are very distressing for her.

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Serum testosterone	3.6 nmol/L	(0.5-3)
Serum sex hormone binding protein	32 nmol/L	(40-137)
Plasma luteinising hormone	4.8 U/L	(2.5-10)
Plasma follicle-stimulating hormone	2.5 U/L	(2.5-10)
Plasma prolactin	380 mU/L	(<360)

What is the most appropriate treatment for her hirsutism and her underlying condition?



Key learning points 🛭

Endocrinology

• First-line therapy for PCOS has traditionally been the preparation Dianette, which contains ethinyloestradiol (35 lg) in combination with cyproterone acetate (2 mg).

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Explanation

The most appropriate treatment for this woman who has polycystic ovary syndrome (PCOS) with the most prominent feature being hirsutism would be the OCP. First-line therapy has traditionally been the preparation Dianette, which contains ethinyloestradiol (35 μ g) in combination with cyproterone acetate (2 mg).

Hyperprolactinaemia in this case with normal oestradiol would be most likely to be the functional hyperprolactinaemia associated with PCOS rather than due to any prolactin secreting pituitary disorder.

The significance of the sex hormone binding protein is that Sex hormone binding globulin is lower in PCOS. The reasons include that androgens reduce the globulin production, whereas oestrogen promotes production. It is a protein for transport of hormones in the blood.

REFERENCE:-

The Obstetrician & Gynaecologist

Polycystic ovary syndrome (PCOS)

JAN 2017

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BMJ OnExamination Assessment

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English French

Question 60 of 100

A 62-year-old man who is taking canagliflozin comes to the Emergency department for review, having suffered low impact fractures to two of the toes on his right foot. He has lost 5 kg in weight on therapy over the past 6 months, and seen a small reduction in his blood pressure.

On examination his BP is 132/72mmHg, pulse is 70/min and regular. His chest is clear. Abdomen is soft and non-tender and his BMI is 30. There is obvious bruising and swelling over the 4th and 5th metatarsals of the right foot, and an x ray confirms the fractures. Creatinine is at the upper end of the normal range, and Calcium is 2.15 mmol/l, (2.1-2.65).

Which of the following is the most likely cause of the fractures?

- O Increased calcitonin
- O Increased fibroblast growth factor (FGF-21)
- O Peroxisome proliferator activated receptor (PPAR) gamma activation
- O Decreased fibroblast growth factor (FGF-23)
- Increased parathyroid hormone (PTH)



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English French



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Which of the following is the most likely cause of the fractures?



Key learning points 🛭



Endocrinology

• SGLT-2 inhibition is associated with increased risk of bone fracture, this is thought to be associated with a small but significant increase in PTH.

Explanation

As use of SGLT-2 inhibitors has broadened, and more extensive clinical trials (including cardiovascular outcome studies) have begun to report out, it has become apparent that SGLT-2 inhibitors increase levels of PTH, drive an increase in bone turnover, and are associated with increased risk of bone fracture.

It is also thought that FGF-23 levels increase in patients taking SGLT-2 inhibitors, and elevated FGF-23 is thought to reduce levels of vitamin D, which in turn may reduce bone mineralisation. Calcitonin levels are not significantly affected by SGLT-2 inhibition, and conflicting data exists as to the impact of FGF-21 on bone mineral density. PPAR gamma activation is associated with glitazone use, which leads to increased fat deposition within bone, and consequent increased risk of fracture.

References:

FDA Strengthens Fracture Warning for Canagliflozin

Possible adverse effects of SGLT2 inhibitors on bone

Next question

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BMJ On Exam

English French

Question 61 of 100

☆ High impact question

A 72-year-old female was admitted with a deteriorating dyspnoea and fever which had deteriorated over the preceding three days.

Prior to this admission she had been well having returned one week ago from a Spanish holiday with her husband. The only other history of note was that three years ago she was diagnosed with type 2 diabetes for which she was treated with diet alone. She is a smoker of five cigarettes per day.

On examination she was suntanned, slightly confused with saturations of 92% on air. She had a pyrexia of 40°C, a pulse of 118 bpm and a blood pressure of 118/90 mmHg. Auscultation of the chest revealed left basal crackles only.

Investigations showed:

Haemoglobin	143 g/L	(115-165)
White cell count	8.2 ×10 ⁹ /L	(4-11)
Platelets	320 ×10 ⁹ /L	(150-400)
Serum sodium	123 mmol/L	(137-144)
Serum potassium	3.6 mmol/L	(3.5-4.9)
Urea	4.2 mmol/L	(2.5-7.5)
Plasma glucose	10.9 mmol/L	(3.0-6.0)
Urine sodium concentration	35 mmol/L	-
Serum sodium Serum potassium Urea Plasma glucose	123 mmol/L 3.6 mmol/L 4.2 mmol/L 10.9 mmol/L	(137-144) (3.5-4.9) (2.5-7.5)

Arterial blood gas analysis:

рН	7.36	(7.36-7.44)
pCO ₂	5.1 kPa / 38 mmHg	(4.7-6.0 kPa)
pO ₂	10.7 kPa / 80 mmHg	(11.3-12.6 kPa)

Standard bicarbonate 30 mmol/L (20-28)

Which of the following tests would be most useful in providing diagnostic information?

\circ	Sputum culture
0	Serum antibody tests
\circ	Blood culture
\bigcirc	Short Synacthen test
\bigcirc	Urine antigen test

Answer question

Time elapsed

My score

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BMJ On Exam

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Urea	4.2 mmol/L	(2.5-7.5)
Plasma glucose	10.9 mmol/L	(3.0-6.0)
Urine sodium concentration	35 mmol/L	-

Arterial blood gas analysis:

рН	7.36	(7.36-7.44)
pCO ₂	5.1 kPa / 38 mmHg	(4.7-6.0 kPa)
pO_2	10.7 kPa / 80 mmHg	(11.3-12.6 kPa)

Standard bicarbonate 30 mmol/L (20-28)

Which of the following tests would be most useful in providing diagnostic information?

Sputum culture	■ 2%
Serum antibody tests	■ 2%
Blood culture	■ 3%
Short Synacthen test	9 %
Urine antigen test 🗸	84%

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Key learning points 🛭

Endocrinology, Respiratory Medicine

• Legionnaire's disease may be assocaited with hyponatreamia secondary to SIADH

Explanation

This patient is likely to have legionnaire's disease.

This is due to Legionella pneumophila a Gram negative rod which is frequently found in heating systems and air conditioner units.

The urinary antigen test for *Legionella* species is the most useful test being rapidly available and accurate (70% specificity and 100% sensitivity).

Blood cultures are frequently negative and sputum culture may not be positive and take approximately three days to process.

Again serologic tests for *Legionella* antibodies may be negative for up to three months after infection and require acute and convalescent samples.

It is associated with a 5-15% mortality associated with respiratory and renal failure. The low serum sodium and urine sodium excretion are mainly related to SIADH.

It is treated with macrolides and/or ofloxacins.

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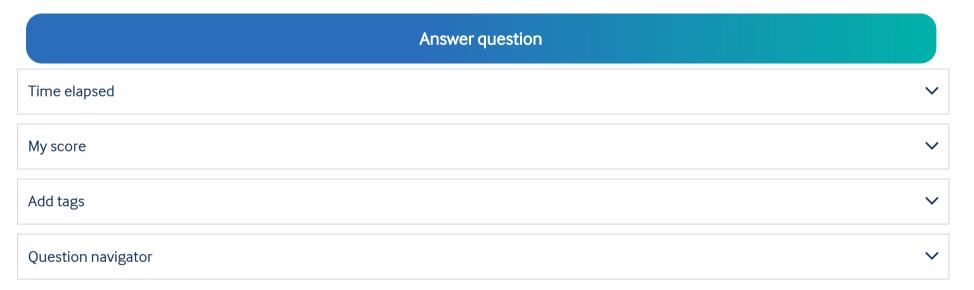
Question 62 of 100

This serum specimen was obtained on a 46-year-old male admitted under the care of the surgeons.



What is the likely explanation for this appearance?

- O Tangier disease
- Apolipoprotein CII deficiency
- Dysbetalipoproteinaemia
- O Lipoprotein lipase deficiency
- O Hepatic LDL receptor deficiency



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English French



This serum specimen was obtained on a 46-year-old male admitted under the care of the surgeons.



What is the likely explanation for this appearance?

Tangier disease	
rungier discuse	10%
Apolipoprotein CII deficiency	
	17%
Dysbetalipoproteinaemia	
	23%
Lipoprotein lipase deficiency 🗸	
	43%
Hepatic LDL receptor deficiency X	
	7 %

Key learning points 🛭



• Lipoprotein lipase deficiency will produce hyperchylomicronaemia/hypertriglycerideamia.

Explanation

This milky looking serum sample is due to hyperchylomicronaemia/hypertriglyceridaemia and is a consequence of deficiency of lipoprotein lipase (LPL).

Xanthomas, and lipaemia retinalis are features and pancreatitis and gout occur.

It can occur as the primary condition due to a rare autosomal recessive loss of LPL, or more commonly is secondary to diseases such as:

- Pancreatitis
- Hypothyroidism
- Type 1 diabetes
- Alcoholism, and
- Cushing's syndrome.

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Apolipoprotein C-II deficiency (rare autosomal recessive hereditary disorder) is an inhibitor to lipoprotein lipase and may cause this type of appearance, but is extremely rare and manifests in childhood.

Tangier disease is an extremely rare autosomal recessive metabolic disorder.

Characteristics of Tangier disease include:

- Decreased levels or even a complete absence of high-density lipoproteins (HDL) concentrations in the plasma
- Low cholesterol levels in the plasma
- Increased cholesteryl esters in the tonsils, spleen, liver, skin and lymph nodes.

One easily seen characteristic usually found in children with Tangier disease is the presence of enlarged, yellow-orange tonsils.

Hepatic low density lipoprotein (LDL) receptor deficiency is a feature of familial hypercholesterolaemia.

Next question

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Question 63 of 100

A 33-year-old female presents with a six month history of weight loss, sweats and palpitations. Her appearance is shown.



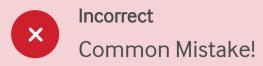
Which of the following disorders is most likely to be associated with her diagnosis?

- O Type 1 diabetes mellitus
- O Addison's disease
- O Pernicious anaemia
- Vitiligo
- O Coeliac disease



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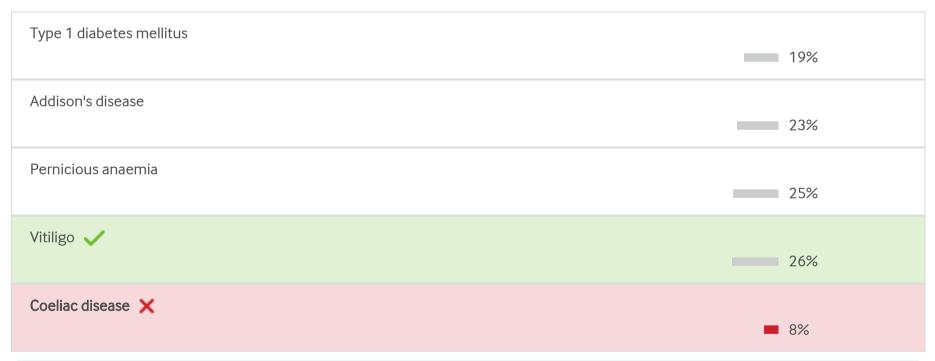
English French



A 33-year-old female presents with a six month history of weight loss, sweats and palpitations. Her appearance is shown.



Which of the following disorders is most likely to be associated with her diagnosis?



Endocrinology

• Grave's disease is associated with vitiligo (7%)

Explanation

This patient has Graves' disease as indicated by the goitre and mild eye signs of periorbital puffiness.

The most likely associate of Graves' disease is vitiligo occurring in approximately 7% of cases.

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It is important to appreciate that autoimmunity is relatively common in association with thyroid autoimmunity and include type 1 diabetes mellitus, Addison's, pernicious anaemia and Sjögren's.

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BMJ On Exam

English French

Question 64 of 100

A 22-year-old female is seen in the cardiology clinic because of recurrent collapses with loss of consciousness, which tend to occur late in the morning or late afternoon. These have deteriorated over the last six months and most recently have occurred several times a week.

These episodes have been preceded by tremor and perspiration and on occasion have been relieved or prevented by her eating chocolate. Following the episode there is no confusion, disorientation or residual weakness. She has also noted these problems occurring when she indulges in exercise.

On examination, the patient has a BMI of 26 kg/m 2 and says she has put on 4 kg in the past three months. She has a pulse rate of 72/min $^{-1}$, blood pressure is 124/76 mmHg lying and 128/78 mmHg standing, heart sounds S1, S2 are audible with no added sounds or murmurs.

The patient is clinically euthyroid. Per abdomen there are no palpable masses and she has no enlarged liver, spleen or kidneys. There is no evidence of clinical neurological deficit.

Initial investigations show:

Haemoglobin	135 g/L	(115-165)
WCC	4.2 ×10 ⁹ /L	(4-11)
Platelet count	175 ×10 ⁹ /L	(140-400)
Serum sodium	143 mmol/L	(137-144)
Serum potassium	4.2 mmol/L	(3.5-4.9)
Serum urea	6.0 mmol/L	(2.5-7.5)
Serum creatinine	78 µmol/L	(60-110)
Serum corrected calcium	2.5 mmol/L	(2.2-2.6)
Serum phosphate	0.9 mmol/L	(0.8-1.4)
Glucose	4.8 mmol/L	(3.0-6.0)
TSH	2.1 mU/L	(0.4-5)
Free T ₄	17.0 pmol/L	(10-22)
Free T ₃	6.0 pmol/L	(5-10)

ECG shows sinus rhythm.

Chest x ray: Normal cardiac silhouette and clear lung fields.

What is the most appropriate investigation for this patient?

- Admission for prolonged fast
 24 hour collection of urine for catecholamines
 MRI scan of brain
 Reassurance
- O 24 hour ambulatory ECG

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ECG shows sinus rhythm.

Chest x ray: Normal cardiac silhouette and clear lung fields.

What is the most appropriate investigation for this patient?





Key learning points $\, \, \mathbb{Q} \,$

Cardiology, Endocrinology

• Insulinoma can present with collapse/sweating relieved by carbohydrate

Explanation

The history in this case suggests an insulinoma.

The episodes of collapse are preceded by adrenergic drive, occur many hours after feeding, and are relieved by the administration of carbohydrate; all are suggestive of this diagnosis. The recent weight gain is also supportive.

There is no evidence of structural cardiac anomaly and the ECG shows sinus rhythm with no suggestion of arrhythmia. There is no clinical evidence of neurological disease.

The patient is normotensive, there is no flushing and no other features to suggest phaeochromocytoma.

The investigation of choice is hospital admission for prolonged fasting in an effort to precipitate an episode of hypoglycaemia. In the event of this, laboratory blood glucose, insulin and C peptide should be measured.

Next question

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English French

Question 65 of 100

A 60-year-old male patient is referred to the outpatient department complaining of tiredness, lethargy, sweats and weight loss over the past six months. On further questioning he reports diminished libido and erectile dysfunction.

On examination, he is pale with a resting pulse of 108 bpm and a bounding pulse. His blood pressure is 122/82 mmHg and he has normal heart sounds. Chest is clear to auscultation and the abdomen is soft with no abnormal enlargement of organs.

He has a smooth goitre; eye movements are normal with no evidence of dysthyroid eye disease and visual fields are intact to confrontation.

The GP has performed a number of investigations, which are shown here:

Haemoglobin	115 g/L	(130-180)
White cell count	11.0 ×10 ⁹ /L	(4-11)
Platelets	205 ×10 ⁹ /L	(150-400)
Sodium	130 mmol/L	(137-144)
Potassium	4.0 mmol/L	(3.5-4.9)
Urea	7.8 mmol/L	(2.5-7.5)
Creatinine	89 μmol/L	(60-110)
Alkaline phosphatase	150 U/L	(45-105)
Calcium	2.30 mmol/L	(2.2-2.6)
Albumin	38 g/L	(37-49)
TSH	10 mU/L	(0.5-6.0)
Free T4	38 pmol/L	(9-25)
Free T3	10 pmol/L	(3.4-5.5)

Which of the following is the likely diagnosis?

- Surreptitious thyroxine ingestion
- $\bigcirc \qquad \mathsf{TSH} \ \mathsf{secreting} \ \mathsf{pituitary} \ \mathsf{tumour}$
- O Thyroid cancer
- O Graves' disease
- O DeQuervain's thyroiditis

Answer question

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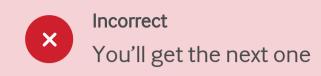
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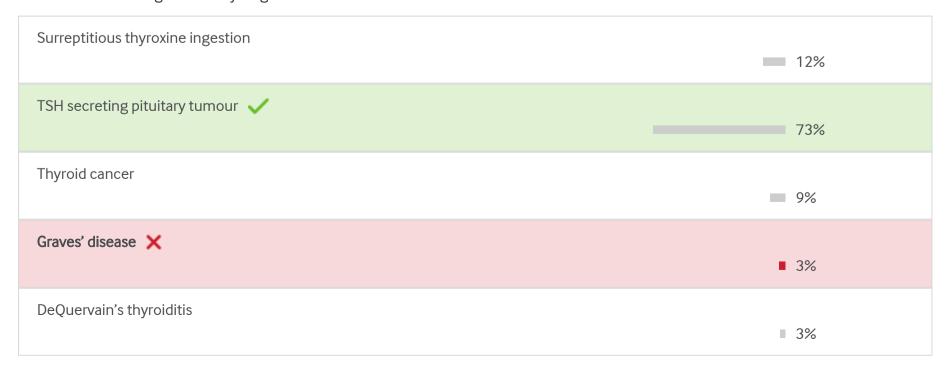
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Creatinine	89 μmol/L	(60-110)
Alkaline phosphatase	150 U/L	(45-105)
Calcium	2.30 mmol/L	(2.2-2.6)
Albumin	38 g/L	(37-49)
TSH	10 mU/L	(0.5-6.0)
Free T4	38 pmol/L	(9-25)
Free T3	10 pmol/L	(3.4-5.5)

Which of the following is the likely diagnosis?



Key learning points 🛭

Endocrinology, Thyroid

• A TSHoma is rare. It usually presents with clinical hyperthyroidism in the context of raised TSH, T4 and T3.

Explanation

This patient has a thyrotrophinoma, a rare type of pituitary tumour accounting for approximately less than 1% of cases, the majority (90%) of which are macroadenomas.

Presentation is with features of thyrotoxicosis:

- sweating
- weight loss
- lethargy
- tachycardia
- potential <u>hypopituitarism</u>
- erectile dysfunction
- diminished libido, and
- <u>hyponatraemia</u> (as in this case).

The biochemical features suggesting the diagnosis include elevated thyroid-stimulating hormone (TSH) in context of elevated thyroxine (T4) and tri-iodothyronine (T3), elevated alkaline phosphatase is consistent with thyrotoxicosis and hyponatraemia suggests hypoadrenalism.

The appropriate management includes biochemical evaluation of pituitary function, MRI imaging of the pituitary gland and formal evaluation of visual fields.

The biochemistry is not consistent with Graves' disease where a suppressed TSH would be expected.

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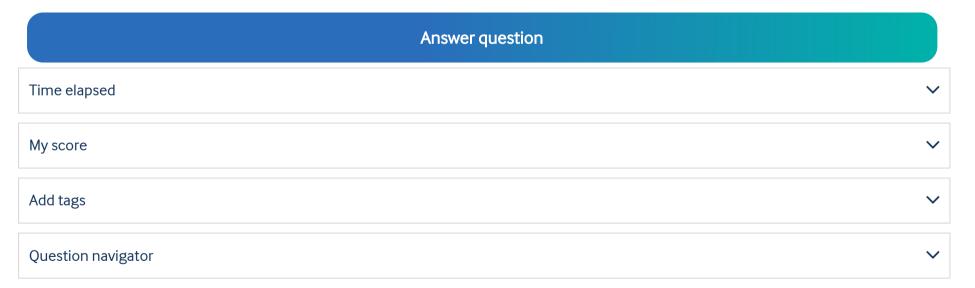
☆ High impact question

This 40-year-old female is admitted with a two month history of abdominal pains, watery diarrhoea and has noted this extensive rash.



What is this rash?

- O Erythema ab igne
- O Necrolytic migratory erythema
- Acquired ichthyosis
- Erythema migrans
- O Erythema repens gyratum



BMJ On Exam

English French



★ High impact question

This 40-year-old female is admitted with a two month history of abdominal pains, watery diarrhoea and has noted this extensive rash.



What is this rash?



Key learning points 🛭

Dermatology, Endocrinology, Photographic

• Glucagonoma is associated with necrolytic migratory erythema

Explanation

The symptoms with this rash, which is typical of necrolytic migratory erythema, suggest a glucagonoma.

Other features of glucagonoma include:

- Diabetes mellitus
- Hypoaminoacidaemia
- Cheilosis
- Normochromic normocytic anaemia
- Venous thrombosis
- Neuropsychiatric features.

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At least 50% are metastatic at presentation, so prognosis is poor.

Acquired ichthyosis appears as symmetrical scaling of the skin and is a cutaneous manifestation of underlying malignancy.

Erythema migrans is associated with Lyme disease.

Erythema ab igne/livedo reticularis has the appearance of chain mail.

Erythema repens gyratum is another paraneoplastic phenomenon, commonly lung, breast, stomach, etc.

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English French

Question 67 of 100

This 60-year-old female presents with 5 kg weight loss, weakness and lethargy.



Investigations reveal:

Serum sodium	130 mmol/L	(137-144)
Serum potassium	4.7 mmol/L	(3.5-4.9)
Serum urea	7.2 mmol/L	(2.5-7.5)
Serum creatinine	100 μmol/L	(60-110)
Serum glucose	4.5 mmol/L	(3.0-6.0)
Serum calcium	2.65 mmol/L	(2.2-2.6)

Which of the following tests would be most appropriate for this patient?

- Oral glucose tolerance test
- O PTH concentration
- O Thyroid function tests
- O Short Synacthen test
- O Anti-endomysial antibodies

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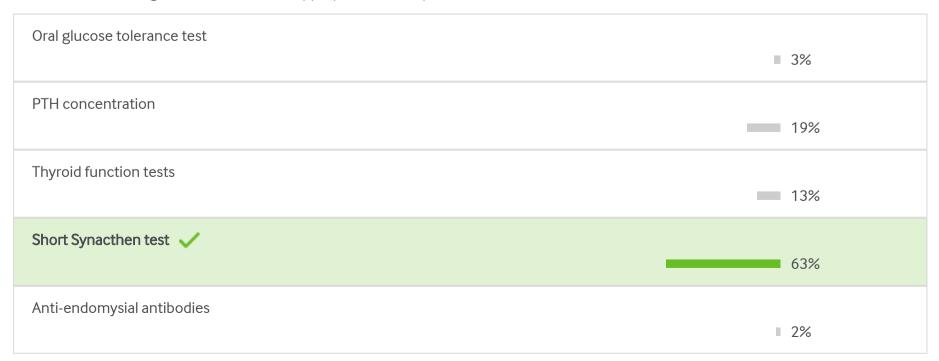
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Serum urea	7.2 mmol/L	(2.5-7.5)
Serum creatinine	100 μmol/L	(60-110)
Serum glucose	4.5 mmol/L	(3.0-6.0)
Serum calcium	2.65 mmol/L	(2.2-2.6)

Which of the following tests would be most appropriate for this patient?



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Key learning points 🛭

Endocrinology, Photographic

• Short synacthen test confirms diagnosis of Addison's disease

Explanation

This patient has weight loss, lethargy and appears rather thin and pigmented.

Investigations reveal a mild <u>hyponatraemia</u> which suggests a diagnosis of primary hypoadrenalism. The diagnosis would be confirmed by the short Synacthen test and a failure of cortisol to exceed 550 nmol/L 30 minutes after 250 μ g of Synacthen would be diagnostic.

Primary hypoadrenalism may also cause mild hypercalcaemia and derangement of the thyroid function tests.

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BMJ On Exam

English French

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A 17-year-old female presents with a two day history of vomiting, general lethargy and giddiness.

Over the last six months she had lost 5 kg in weight, had a reduced appetite and had been feeling increasingly lethargic. She had no past medical history of note, was a non-smoker and took the combined oral contraceptive pill for contraception. Her elder brother was well and there was a family history of thyroid disease with both her mother and maternal grandmother taking thyroxine.

On examination, she was comfortable at rest, appeared slightly dehydrated was apyrexial, had a body mass index of 18.5 kg/m^2 and oxygen saturations on air of 99%. Her blood pressure was 102/64 mmHg and fell to 86/60 mmHg on standing. Her pulse was 90 beats per minute regular and auscultation of the heart and chest were normal. No abnormalities were detected on abdominal or CNS examination.

Investigations revealed:

Haemoglobin	105 g/L	(115-165)
Mean cell volume	88 fL	(80-96)
White cell count	8.8 ×10 ⁹ /L	(4-11)
Neutrophils	4.4 ×10 ⁹ /L	(1.5-7)
Lymphocytes	2.8 ×10 ⁹ /L	(1.5-4)
Eosinophils	0.8 ×10 ⁹ /L	(0.04-0.4)
Serum sodium	130 mmol/L	(137-144)
Serum potassium	5.8 mmol/L	(3.5-4.9)
Serum urea	12.8 mmol/L	(2.5-7.5)
Serum creatinine	135 μmol/L	(60-110)
Plasma glucose	3.8 mmol/L	(3.0-6.0)
Free T4	8.8 pmol/L	(10-22)
TSH	1.2 mu/L	(0.4-5)
Urinalysis	Ketones +	

Which of the following is the most appropriate investigation for this patient?

- CT adrenals
- O Short Synacthen test
- O Thyroid autoantibodies
- MRI pituitary
- O Adrenal autoantibodies

Answer question

9/10/24, 10:46 AM BMJ OnExamination Assessment



9/10/24, 10:46 AM BMJ OnExamination Assessment

BMJ On Exam

English French



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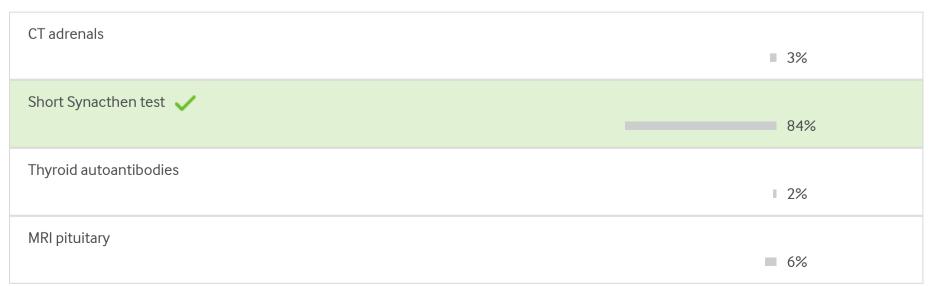
Over the last six months she had lost 5 kg in weight, had a reduced appetite and had been feeling increasingly lethargic. She had no past medical history of note, was a non-smoker and took the combined oral contraceptive pill for contraception. Her elder brother was well and there was a family history of thyroid disease with both her mother and maternal grandmother taking thyroxine.

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Free T4	8.8 pmol/L	(10-22)
TSH	1.2 mu/L	(0.4-5)
Urinalysis	Ketones +	

Which of the following is the most appropriate investigation for this patient?





Key learning points 🛭



Emergency Medicine, Endocrinology

• Addison's disease is diagnosed by short synacthen test.

Explanation

The salient features in this young patient's case are the longstanding asthenia with weight loss and the sudden episode of vomiting.

She appears clinically dehydrated as demonstrated by the postural hypotension but her results reveal a hyponatraemia, hyperkalaemia and hyperuricaemia. Her full blood count shows an eosinophilia.

The most likely diagnosis is acute hypoadrenalism due probably to Addison's disease in view of the strong family history of autoimmune disease. The diagnosis should be confirmed with a short Synacthen test and a cortisol response less than 550 nmol/L is confirmatory.

Abnormal thyroid function tests with low thyroxine (T4) and normal thyroid-stimulating hormone are quite commonly associated with Addison's and do not reflect secondary hypothyroidism but sick euthyroidism.

Thyroxine replacement must not be given to these patients as it can exacerbate the adrenal crisis. The thyroid function tests will normalise with hydrocortisone therapy.

Even if this were hypopituitarism an MRI of the pituitary would not diagnose hypoadrenalism and again this could be confirmed with a short Synacthen test.

Next question

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9/10/24, 10:46 AM BMJ OnExamination Assessment

BMJ On Exam

English French

Question 69 of 100

A 65-year-old male is admitted after being found by the police collapsed in the centre of town. He is a known alcoholic and is dishevelled and dirty.

Examination reveals a confused male with a Glasgow coma scale of 13, a temperature of 37°C, a pulse of 110 bpm regular and a blood pressure of 138/96 mmHg with oxygen saturations of 98%. There are no specific abnormalities on examination, with normal reflexes, tone and down going plantars. He has a respiratory rate of 30 per minute.

Investigations show:

Haemoglobin	115 g/L	(130-180)
MCV	102 fL	(80-96)
White cell count	8.2 ×10 ⁹ /L	(4-11)
Platelets	150 ×10 ⁹ /L	(150-400)
Serum sodium	136 mmol/L	(137-144)
Serum potassium	3.6 mmol/L	(3.5-4.9)
Serum urea	7.0 mmol/L	(2.5-7.5)
Serum creatinine	120 μmol/L	(60-110)
Plasma glucose	5.2 mmol/L	(3.0-6.0)

Arterial blood gas analysis shows:

рН	7.24	(7.36-7.44)
pO_2	14.7 kPa / 110 mmH	g(11.3-12.6)
pCO ₂	4.0 kPa / 30 mmHg	(4.7-6.0)
Standard HCO	3 17 mmol/L	(20-28)

Which investigation is most likely to assist with a diagnosis?

- Salicylate concentration
- Ammonia concentration
- O Methanol concentration
- O Vitamin B12 levels
- O Benzodiazepine concentration

Time elapsed My score Add tags

9/10/24, 10:46 AM BMJ OnExamination Assessment

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BMJ On Exam

English French



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pCO ₂	4.0 kPa / 30 mmHg	(4.7-6.0)
Standard HCO	₃ 17 mmol/L	(20-28)

Which investigation is most likely to assist with a diagnosis?

Salicylate concentration	13%
Ammonia concentration	■ 5%
Methanol concentration 🗸	57%
Vitamin B12 levels X	■ 2%
Benzodiazepine concentration	■ 2%

9/10/24, 10:46 AM

BMJ OnExamination Assessment

Emergency Medicine, Endocrinology

• Presentation of metabolic acidosis in a patient with methanol toxicity

Explanation

This patient has a metabolic acidosis and reduced conscious level that exceeds the metabolic derangement.

His alcohol history and appearance suggests consumption of methanol which is a weak acid and would account for this clinical picture and the biochemical abnormalities.

Salicylate overdose is another possibility but less likely.

Benzodiazepines would be expected to cause respiratory depression and respiratory acidosis.

His increased mean corpuscular volume (MCV) is more than likely due to his alcohol abuse and B12 concentrations would not be helpful.

This presentation is not typical of hepatic encephalopathy as flapping tremor is expected and extensor plantar responses.

Next question

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Question 70 of 100

A 78-year-old male presents with exertional shortness of breath and palpitations. His symptoms developed over the last 24 hours.

Previously he was active but was diagnosed with angina two years ago for which he takes isosorbide mononitrate 60 mg daily, atorvastatin 10 mg daily, diltiazem 200 mg daily and aspirin 75 mg daily. Two months ago he presented to his GP with general apathy and was commenced on fluoxetine 20 mg daily.

On examination he was noted to have a heart rate of 122 beats per minute irregularly irregular, a blood pressure of 120/80 mmHg but otherwise appears fine. In particular he appeared clinically euthyroid and no goitre was palpable on examination. ECG confirmed atrial fibrillation.

Investigations reveal:

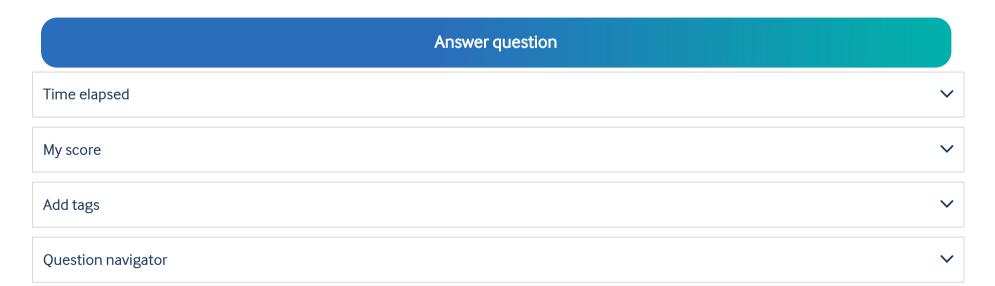
 \bigcirc

Serum free T4	26.5 pmol/L	(10-22)
Serum free T3	4.8 pmol/L	(5-10)
Serum TSH	0.1 mU/L	(0.4-5.0)
Thyroid autoantibodies	Negative	-
ESR (Westergren)	28 mm/1 st hr	(0-10)

What is the likely cause of his abnormal thyroid function tests?

Hashimoto's toxicosis
 Drug-induced thyrotoxicosis
 Solitary toxic thyroid nodule
 Graves' disease

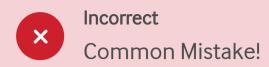
DeQuervain's thyroiditis



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BMJ On Exam

English French



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Thyroid autoantibodies	Negative	-
ESR (Westergren)	28 mm/1 st hr	(0-10)

What is the likely cause of his abnormal thyroid function tests?



Endocrinology

• Solitary toxic nodule will produce a minimal/subclinical hyperthyroidism.

Explanation

This patient has mild thyrotoxicosis as reflected by the raised T4 and low TSH but normal T3 and his prior symptoms of apathy probably relate to this.

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In the absence of any thyroid auto-antibodies which argue against both Graves' disease and hashitoxicosis, the most likely diagnosis is a solitary toxic nodule. A nodule is not always picked up on physical examination as in this case, though usually can be a palpable structure.

DeQuervain's is associated with a tender goitre, weight loss and general malaise. A markedly raised ESR (>50 and usually 100) is typical. This man's ESR would be considered reasonable for his age.

None of the drugs mentioned would cause this picture. There are case reports of fluoxetine induced thyrotoxicosis but this is rare. Typically drugs responsible for deranged TFTs include amiodarone.

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BMJ On Exam

English French

Question 71 of 100

A 58-year-old male with a three year history of type 2 diabetes mellitus (T2DM) presents to his GP with polyuria and weight gain.

His current medication includes gliclazide 160 mg bd and metformin 850 mg tds. His blood pressure is 128/78 mmHg and his body mass index (BMI) is 38 kg/m^2 .

His blood tests demonstrate:

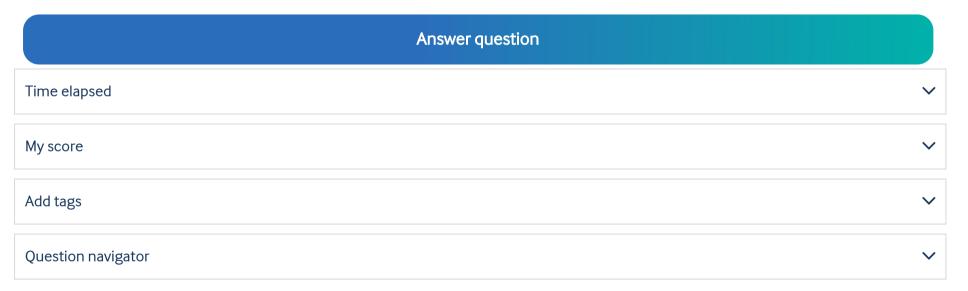
HbA ₁	84 mmol/mol	(<42)
DDA16	04 11111101/11101	(~42)

9.8% (<6.0)

Creatinine 118 µmol/L (<120)

What is the most suitable treatment?

- Add rosiglitazone
- O Increase gliclazide by adding a further 80 mg at lunchtime
- Add pioglitazone
- Add sitagliptin
- Add liraglutide



BMJ On Exam

English French



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His blood tests demonstrate:

 HbA_{1c} 84 mmol/mol (<42)

9.8% (<6.0)

Creatinine 118 µmol/L (<120)

What is the most suitable treatment?

Add rosiglitazone	■ 2%
Increase gliclazide by adding a further 80 mg at lunchtime	■ 3%
Add pioglitazone	12%
Add sitagliptin	41%
Add liraglutide	43%

Endocrinology

• Management of T2DM

Explanation

The management of T2DM has changed recently following new medications affecting the glucagon-like peptide (GLP) and dipeptidyl peptidase IV (DPP-IV) systems.

Liraglutide and exenatide are GLP-1 agonists/mimetics. Sitagliptin, vildagliptin and saxagliptin are inhibitors of the enzyme DPP-IV, which normally cleaves and destroys endogenous GLP-1.

The standard initial treatment of T2DM is metformin which is weight neutral and reduces peripheral insulin resistance (mechanism unclear). Sulphonylureas such as gliclazide are a common second agent but cause weight gain and hypoglycaemia.

In the past, the third line options were either peroxisome proliferator activated receptor (PPAR) gamma agonists such as pioglitazone or rosiglitazone. The latter has been withdrawn from the market following concerns about cardiovascular outcomes. Both agents can cause weight gain and hypoglycaemia.

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The National Institute for Health and Care Excellence (NICE) guidelines recommend the use of DPP-IV inhibitors in certain situations, such as in the elderly or when other agents are not tolerated. These agents are weight neutral and have a lower risk of hypoglycaemia, so may be safer in certain groups. DPP-IV inhibitors give around a 11 mmol/mol (1%) improvement in HbA_{1c}, but no more.

Exenatide and liraglutide are injectable treatments which can cause around 2-3 kg weight loss with an improvement of 11-22 mmol/mol (1-2%) in HbA_{1c}. Liraglutide has been recommended for use either as a second line or a third line agent in patients with uncontrolled HbA_{1c} and BMI greater than 35 kg/m².

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BMJ On Exam

English French

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Question 72 of 100

☆ High impact question

A 68-year-old man presents with gynaecomastia. He is otherwise well.

His blood tests are shown below:

LH 15.0 U/L (1.5-6.3)

FSH 22.6 U/L (1.0-10.0)

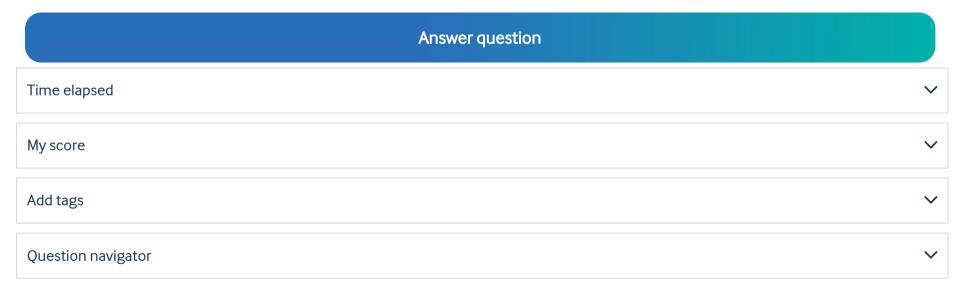
Testosterone 7.5 nmol/L (8.0-29.0)

Oestradiol 170 pmol/L (<180)

Prolactin 150 mU/L (45-375)

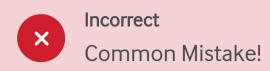
What is the most likely cause?

- Hypopituitarism
- Oestrogen-producing tumour
- O Primary testicular failure
- Craniopharyngioma
- Hyperthyroidism



BMJ On Exam

English French



☆ High impact question

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Testosterone 7.5 nmol/L (8.0-29.0)

Oestradiol 170 pmol/L (<180)

Prolactin 150 mU/L (45-375)

What is the most likely cause?

Hypopituitarism	
Туроришкитэтт	■ 3%
Oestrogen-producing tumour	■ 6%
Primary testicular failure 🗸	83%
Craniopharyngioma	7 %
Hyperthyroidism X	I 1%

Endocrinology

• Pituitary hormones; gonadal disease.

Explanation

Gynaecomastia results from an imbalance of oestrogens and androgens in the male patient.

The incidence of gynaecomastia typically occurs at three distinct periods of life:

- Neonatal due to maternal oestrogens crossing the placenta
- Puberty low testosterone and dihydrotestosterone (DHT) during puberty
- Adult life typically 50-80-years-old, which may be due to primary testicular failure, obesity or alcohol excess.

Lesions of the pituitary such as craniopharyngiomas can cause hypopituitarism but rarely cause gynaecomastia as luteinising hormone (LH) and follicle-stimulating hormone (FSH), and hence, oestrogen and testosterone production, are reduced.

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Rarer causes of gynaecomastia include hyperthyroidism, oestrogen-producing tumours and human chorionic gonadotropin (hCG)-producing tumours of the liver, testes or adrenal glands.

Drugs known to cause gynaecomastia include:

- Spironolactone
- Eplerenone
- Diltiazem
- Doxazosin
- Bumetanide, and
- Anti-retrovirals including atazanavir, raltegravir and stavudine.

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BMJ On Exam

English French

Question 73 of 100

A 43-year-old male presents with a six month history of tiredness, weight gain and poor concentration.

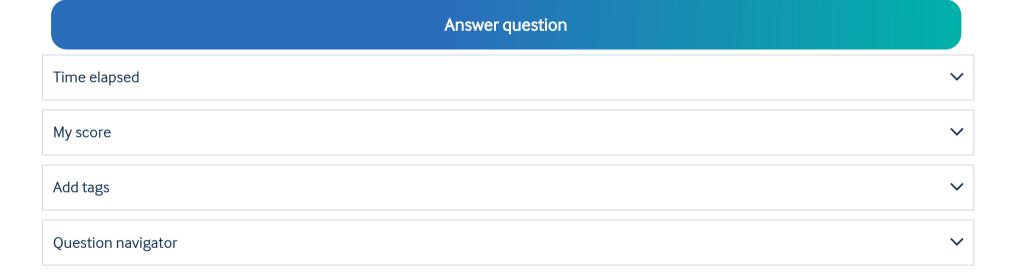
Two years ago he underwent surgery for a non-functional pituitary tumour and has been receiving replacement therapy with hydrocortisone 10 mg mane, 5 mg nocte, thyroxine 150 µg daily and testosterone 250 mg IM monthly.

Investigations reveal:

Free T4	15.9 pmol/L	(10-22)
TSH	0.05 mU/L	(0.4-5)
Testosterone	17.2 nmol/L	(10-30)
IGF-1	9.6 nmol/L	(10-35)

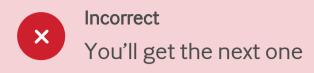
Which of the following would be most likely to improve this man's symptoms?

DDAVP
 Increase dose of hydrocortisone
 Growth hormone
 Reduce dose of thyroxine
 Fludrocortisone



BMJ On Exam

English French



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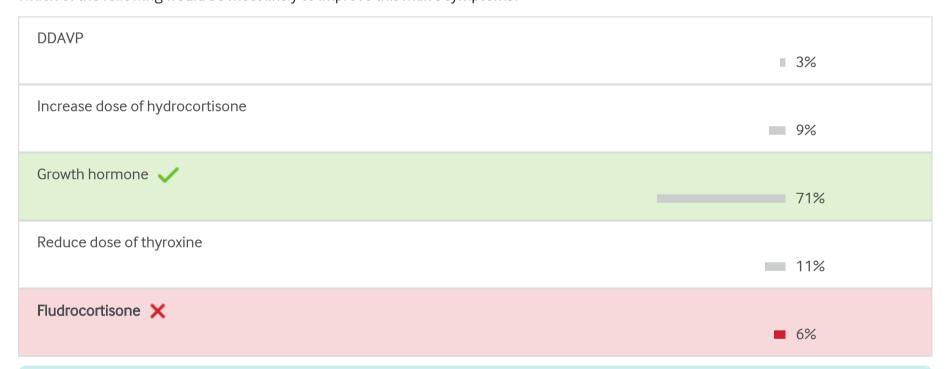
Investigations reveal:

TSH 0.05 mU/L (0.4-5)

Testosterone 17.2 nmol/L (10-30)

IGF-1 9.6 nmol/L (10-35)

Which of the following would be most likely to improve this man's symptoms?



Key learning points 🛭

Endocrinology

• Symptoms of GH deficiency include lethargy, low mood and poor concentration

Explanation

This man appears to be panhypopituitary and is receiving adequate replacement therapy.

His thyroid function tests are typical of a <u>hypopituitarism</u> with a low thyroid-stimulating hormone and therapy would be guided by monitoring his free thyroxine (T4) concentration.

Symptoms of tiredness, poor concentration and weight gain suggest growth hormone (GH) deficiency and this is supported by the low IGF-1 concentration.

If confirmed by appropriate testing and AGHDA score then GH therapy would be the most appropriate treatment.

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9/10/24, 10:48 AM

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BMJ On Exam

English French

Question 74 of 100

A 22-year-old woman who has a history of type 1 diabetes comes to the Emergency department.

She has suffered a viral upper respiratory tract infection which has worsened over the past three days, her glucose has risen to 33 mmol/L on her latest BM estimation.

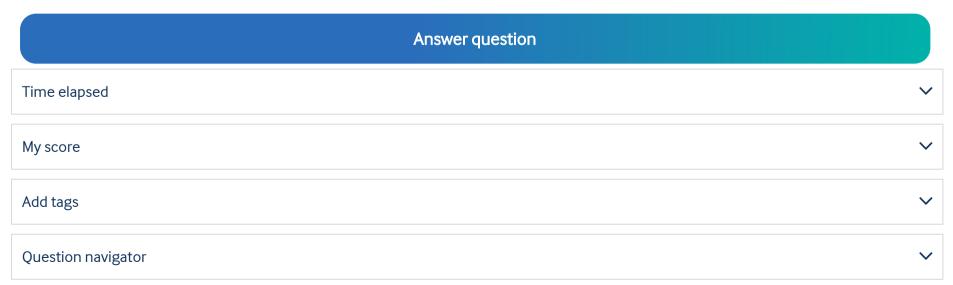
On examination she is pyrexial 37.9, her BP is 100/60 mmHg and her pulse is 95. There are signs of pharyngitis and she has a cough. Her respiratory rate is elevated at 30.

Investigations show:

Haemoglobin	119 g/L	(115-160)
White cell count	10.2 ×10 ⁹ /L	(4-11)
Platelets	220 ×10 ⁹ /L	(150-400)
Sodium	139 mmol/L	(135-146)
Potassium	4.5 mmol/L	(3.5-5)
Creatinine	132 μmol/L	(79-118)
Bicarbonate	14 mmol/L	(22-30)
рН	7.15	(7.35-7.45)
Glucose	38.1 mmol/L	(<7.0)

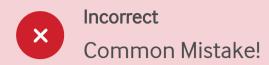
Which of the following is correct when discussing the management of her diabetic ketoacidosis (DKA)?

- O She should be treated with a sliding scale insulin regime
- O Prophylaxis against thromboembolism is not required
- O Ketones < 0.5 mmol/L defines resolution of DKA
- O Potassium replacement is 40 mmol per litre of fluid given and potassium is monitored closely
- O She can be converted back to subcutaneous insulin when the pH is above 7.2



BMJ On Exam

English French



A 22-year-old woman who has a history of type 1 diabetes comes to the Emergency department.

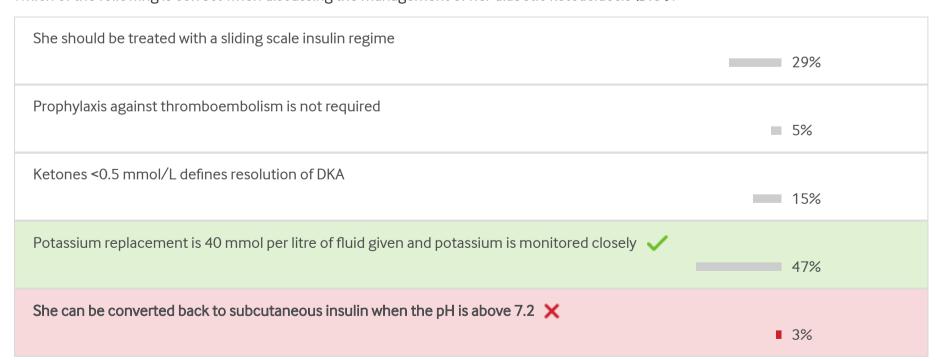
She has suffered a viral upper respiratory tract infection which has worsened over the past three days, her glucose has risen to 33 mmol/L on her latest BM estimation.

On examination she is pyrexial 37.9, her BP is 100/60 mmHg and her pulse is 95. There are signs of pharyngitis and she has a cough. Her respiratory rate is elevated at 30.

Investigations show:

Haemoglobin	119 g/L	(115-160)
White cell count	10.2 ×10 ⁹ /L	(4-11)
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Sodium	139 mmol/L	(135-146)
Potassium	4.5 mmol/L	(3.5-5)
Creatinine	132 μmol/L	(79-118)
Bicarbonate	14 mmol/L	(22-30)
рН	7.15	(7.35-7.45)
Glucose	38.1 mmol/L	(<7.0)

Which of the following is correct when discussing the management of her diabetic ketoacidosis (DKA)?



Key learning points 🛭

Endocrinology

• Management of DKA in adults includes recommends replacement of 40 mmol/L where potassium is between 3.5 and 5.5 mmol/L

Explanation

Guidance from the Joint British Diabetes Societies Inpatient Care Group on <u>The Management of Diabetic Ketoacidosis</u> in Adults recommends potassium replacement of 40 mmol/L where potassium is between 3.5 and 5.5 mmol/L.

Above 5.5 mmol/L serum potassium, replacement is not required. If potassium is below 3.5 then specialist advice should be taken with respect to increasing IV potassium intake.

pH >7.3, ketones <0.3 mmol/L and the patient is able to eat and drink define resolution of DKA, at which time a patient can be converted back to subcutaneous insulin.

Prophylaxis against thromboembolism is required as dehydration and increase in serum glucose increases risk.

Latest guidance recommends use of a fixed rate insulin regime, not a sliding scale.

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9/10/24, 10:48 AM

BMJ OnExamination Assessment

BMJ On Exam

English French

Question 75 of 100

★ High impact question

A 56-year-old seaman presents to his general practitioner with this appearance on the front of his legs.

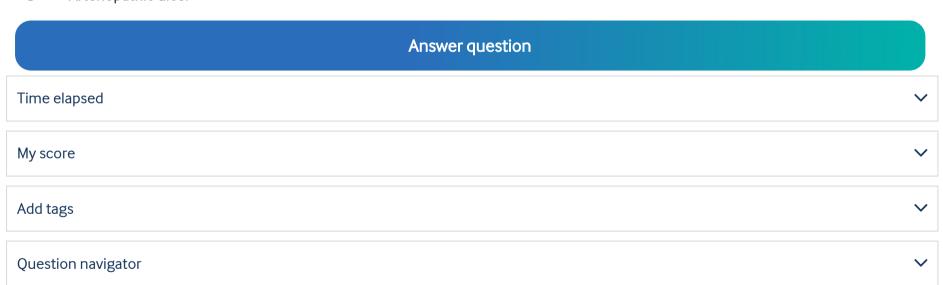


He has had this lesion for at least one year and has received treatment with topical steroids and courses of antibiotics. Despite this the lesion has deteriorated. The lesion is painless and recently he has noticed that the centre has broken down and is slightly oozing.

He has a five year history of diabetes mellitus and receives metformin 500 mg tds. He has also undergone dermatological surgery for skin malignancies on his face over the last six years.

What is this skin lesion?

- O Squamous cell carcinoma
- O Yaws
- O Necrobiosis lipoidica diabeticorum
- Basal cell carcinoma
- Arteriopathic ulcer



BMJ On Exam

English French



★ High impact question

A 56-year-old seaman presents to his general practitioner with this appearance on the front of his legs.



He has had this lesion for at least one year and has received treatment with topical steroids and courses of antibiotics. Despite this the lesion has deteriorated. The lesion is painless and recently he has noticed that the centre has broken down and is slightly oozing.

He has a five year history of diabetes mellitus and receives metformin 500 mg tds. He has also undergone dermatological surgery for skin malignancies on his face over the last six years.

What is this skin lesion?

Squamous cell carcinoma	
	1 7%
Yaws	
	1 7%
Necrobiosis lipoidica diabeticorum 🗸	
	78%
Basal cell carcinoma	
	4 %
Arteriopathic ulcer 🗶	
	4 %

Key learning points 💡

Dermatology, Diabetes, Endocrinology, Photographic

• Necrobiosis lipoidica is a typically painless lesion assoicated with diabetes

Explanation

Necrobiosis lipoidica is a disorder of collagen degeneration with a granulomatous response, thickening of blood vessel walls, and fat deposition.

The exact cause of necrobiosis lipoidica is unknown, but the leading theory of necrobiosis lipoidica has focused on diabetic microangiopathy.

Necrobiosis is often mistaken for <u>eczema</u> but rather than responding to steroids may actually deteriorate. Occasionally ulceration of the lesion may occur.

Necrobiosis is typically painless.

9/10/24, 10:49 AM BMJ OnExamination Assessment

The lesion does not have the appearance of a squamous cell carcinoma which would have an irregular raised edge and be more necrotic.

This is not the site for an arteriopathic ulcer which is usually found on the foot.

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BMJ On Exam

English French

Question 76 of 100

A 29-year-old woman comes to the endocrine clinic as an urgent referral from her GP.

She has had flu-like symptoms and pain over the front of her neck, and is now extremely agitated and anxious. Her husband tells you that she can barely sleep with worry that something nasty is going on. Current medication is the combined oral contraceptive pill.

On examination her BP is 145/82 mmHg, pulse is 95 and regular, she has a fine tremor and her hands are a little sweaty. Heart sounds are normal and her chest is clear, her abdomen is soft and non-tender and her BMI is 22. She is tender over the thyroid on palpation of the neck.

Investigations show:

Haemoglobin	119 g/L	(115 - 160)
White cell count	9.3 ×10 ⁹ /L	(4 - 11)
Platelets	198 ×10 ⁹ /L	(150 - 400)
Sodium	139 mmol/L	(135 - 146)
Potassium	4.0 mmol/L	(3.5 - 5)
Creatinine	100 μmol/L	(79 - 118)
TSH	0.2 IU	(0.5 - 5)

Which of the following is the most appropriate treatment for her symptoms?

 \bigcirc Propranolol

Radioiodine

 \bigcirc

 \bigcirc

 \bigcirc

Carbimazole

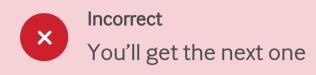
Propylthiouracil

 \bigcirc Thyroxine

Answ	er question
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BMJ On Exam

English French



A 29-year-old woman comes to the endocrine clinic as an urgent referral from her GP.

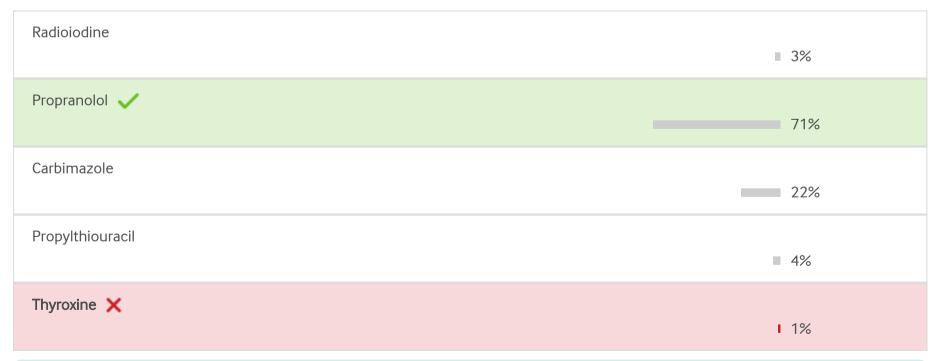
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On examination her BP is 145/82 mmHg, pulse is 95 and regular, she has a fine tremor and her hands are a little sweaty. Heart sounds are normal and her chest is clear, her abdomen is soft and non-tender and her BMI is 22. She is tender over the thyroid on palpation of the neck.

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Creatinine	100 μmol/L	(79 - 118)
TSH	0.2 IU	(0.5 - 5)

Which of the following is the most appropriate treatment for her symptoms?



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• In cases of thyrotoxicosis or thyroid storm the initial treatment is with beta blockers.

Explanation

The most likely explanation here is subacute (De Quervain's) thyroiditis; thyrotoxicosis is related to increased release of stored thyroid hormone rather than increased production of thyroid hormone. As such carbimazole and propylthiouracil are ineffective.

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Propranolol is the most appropriate treatment for her transient symptoms of hyperthyroidism.

Carbimazole and propylthiouracil inhibit thyroid hormone synthesis and are therefore not effective in this situation.

Radioiodine would only be appropriate for Graves' disease, which given the clinical picture is not the most likely diagnosis here.

Given she is thyrotoxic, thyroxine replacement is not a requirement.

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BMJ On Exam

English French

Question 77 of 100

A 48- year-old man with diabetes mellitus presents with a 24 hour history of an increasingly painful left leg.



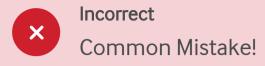
What is the most likely causative organism?

- O Staphylococcus epidermidis
- O Staphylococcus aureus
- Group A Streptococcus
- O Group B Streptococcus
- O Group G Streptococcus

Answer question	
Time elapsed	~
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BMJ On Exam

English French



A 48- year-old man with diabetes mellitus presents with a 24 hour history of an increasingly painful left leg.



What is the most likely causative organism?

Staphylococcus epidermidis	
Cuaprily is a constant and a constan	11%
Staphylococcus aureus	
	28%
Group A Streptococcus	
	34%
Group B Streptococcus 🗸	2/0/
	26%
Group G Streptococcus 🗶	■ 2%
	2%

Key learning points $\, \, \mathbb{Q} \,$

Dermatology, Diabetes, Infectious Diseases, Photographic, Therapeutics

• Group B Streptococcus has a predilection for cellulitis in diabetes

Explanation

Ascending cellulitis is shown.

Staphylococcus aureus and Streptococci are the commonest causative organisms.

Group B Streptococcus has a predilection for diabetic patients and is the likeliest causative organism in this scenario.

Suggest Link/Content

BMJ On Exam

English French

Question 78 of 100

A 65-year-old female is admitted with an intracranial bleed under the care of the neurosurgeons.

Following magnetic resonance angiography she undergoes clipping of a cerebral arterial aneurysm and was well the following morning.

The surgical team document the following blood chemistry results on successive postoperative days:

	Plasma Sodium	Potassium	Urea	Creatinine
Day 1	130 mmol/L	3.5 mmol/L	4.2 mmol/L	95 μmol/L
Day 2	127 mmol/L	3.4 mmol/L	4.2 mmol/L	90 μmol/L
Day 3	124 mmol/L	3.4 mmol/L	4.4 mmol/L	76 μmol/L
Day 4	120 mmol/L	3.5 mmol/L	5.0 mmol/L	70 μmol/L

Normal Ranges:

Plasma sodium 137-144 mmol/L
Potassium 3.5-4.9 mmol/L
Urea 2.5-7.5 mmol/L
Creatinine 60-110 µmol/L

On day four she was commenced on a fluid restriction of 1 litre per day. Investigations at that time show:

Plasma osmolality 262 mOsmol/L (278-305)
Urine osmolality 700 mOsmol/L (350-1000)

Urine sodium 70 mmol/L

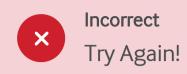
What diagnosis would most likely explain these findings?

- O Syndrome of inappropriate ADH (SIADH)
- Hypoadrenalism
- Sick cell syndrome
- Cranial diabetes insipidus
- Fluid overload

Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



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Plasma osmolality 262 mOsmol/L (278-305)

Urine osmolality $700 \, \text{mOsmol/L} (350-1000)$

Urine sodium 70 mmol/L

What diagnosis would most likely explain these findings?



Endocrinology, Neurology

• Syndrome of inappropriate antidiuretic hormone (SIADH) is diagnosed with hyponatraemia and elevated urine sodium, an osmolality towards the upper limit of normal, and low plasma osmolality.

Explanation

This patient has typical features of syndrome of inappropriate antidiuretic hormone (SIADH) with hyponatraemia and elevated urine sodium, an osmolality towards the upper limit of normal, and low plasma osmolality.

<u>Diabetes insipidus</u> would produce excessive fluid loss with hypernatraemia.

Fluid overload is a possibility but it states that this patient commenced fluid restriction and in fluid overload one would expect a dilute urine to be passed.

Hypoadrenalism may present with hypoadrenalism may present at its may be a supplicable of the present at its management of the present at its management.

Other causes of SIADH include pneumonia, meningitis and carcinoma (bronchial in particular) to name but a few.

Sick cell syndrome is associated with hyponatraemia and is due to loss of cell membrane pump function in particularly ill subjects.

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BMJ On Exam

English French

Question 79 of 100

★ High impact question

A 54-year-old male presents with a three month history of impotence.

He has been aware of deteriorating erections for the last year but over the last three months his erectile function has been particularly poor. He is divorced for the last eight years but five months ago has established a relationship with another woman. Consequently, he is rather distressed by his impotence. He has attempted intercourse, and has been able to achieve slight tumescence, but he is unable to achieve penetrance. Similarly, he is aware of only slight tumescence alone or at night.

As a consequence of his inability to have intercourse he confesses to a reduced interest in sex, has been embarrassed and emotional about his problem. He denies any reduced shaving frequency but has gained weight over the last year or so. He has two children by his previous marriage.

He is employed as a factory worker and together with the weight gain has been feeling a little more tired of late. On weekends he tends to have sleep after lunch. He drinks approximately 15 units of alcohol weekly.

His history is complicated by type 2 diabetes which he has had for five years and is controlled by diet alone. His last HbA_{1c} was 51 mmol/mol (20-46). He takes lisinopril for hypertension together with rosuvastatin and omeprazole for gastroesphageal reflux. He is a non-smoker.

On examination, he has a BMI of 35.4 kg/m^2 , a pulse of 80 bpm and a blood pressure of 138/82 mmHg. He has normal secondary sexual characteristics and there are no abnormalities on examination of the CVS, respiratory or abdominal system. All pulses are palpable, there is no evidence of peripheral neuropathy and fundal examination is normal. Testicular examination is entirely normal with testicular volumes of approximately 12 mls bilaterally.

Investigations reveal:

FRC

FRC	ivormai	-
U+Es	Normal	-
Cholesterol	5.1 mmol/L	(<5.2)
Glucose	7.5 mmol/L	(3.0-6.0)
HbA _{1c}	52 mmol/mol	(20-46)
	6.9%	(3.8-6.4)
Free T4	12.1 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
Testosterone	5.8 nmol/L	(9-30)
LH	2.6 U/L	(2-10)
FSH	5.3 U/L	(2-10)
Prolactin	380 mU/L	(50-450)

Normal

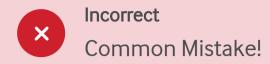
What is the most appropriate treatment for this man's erectile dysfunction?

- Intracavernosal alprostadil
- O Vacuum device

9/10/24, 10:58 AM		BMJ OnExamination Assessment	
0	Oral sildenafil		
0	Transdermal testosterone		
0	Stop lisinopril		
		Answer question	
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BMJ On Exam

English French



★ High impact question

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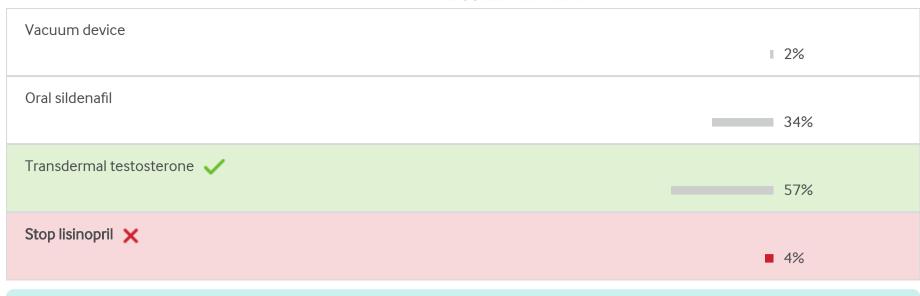
Investigations reveal:

FBC	Normal	-
U+Es	Normal	-
Cholesterol	5.1 mmol/L	(<5.2)
Glucose	7.5 mmol/L	(3.0-6.0)
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	6.9%	(3.8-6.4)
Free T4	12.1 pmol/L	(10-22)
TSH	2.2 mU/L	(0.4-5)
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LH	2.6 U/L	(2-10)
FSH	5.3 U/L	(2-10)
Prolactin	380 mU/L	(50-450)

What is the most appropriate treatment for this man's erectile dysfunction?

Intracavernosal alprostadil

3%



Diabetes, Endocrinology

• Hypotestosteronaemia can present with reduced libido, tiredness and emotional problems and is not an unusual finding in obese diabetic patients

Explanation

This man has features of hypotestosteronaemia with a suggestion of reduced libido, tiredness, having a nap in the afternoon and emotional problems.

Hypogonadism is not unusual in the obese diabetic nor indeed in the metabolic syndrome and seems to arise as a consequence of a combination of tertiary and primary hypogonadism.

In the first instance, to improve sexual function together with libido, it is probably worthwhile starting transdermal testosterone, probably gel.

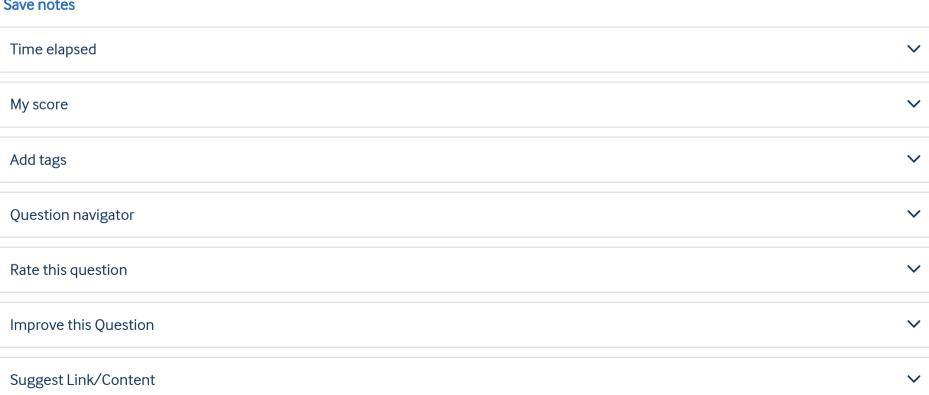
If sexual dysfunction persists then sildenafil or any other phosphodiesterase inhibitor would be an appropriate adjunct.

Next question

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BMJ On Exam

English French

Question 80 of 100

A 75-year-old man has a laparotomy for the correction of a small bowel obstruction. He has a past history of orthotopic bladder reconstruction for carcinoma of the bladder. 48-hours postoperatively on HDU he becomes confused and is unable and unwilling to accept oral fluids. His pulse rate, blood pressure and urine output are within normal limits.

Serum biochemistry reveals:

Na⁺ 147 mmol/L

 K^+ 3.1 mmol/ L^1

Chloride 134 mmol/L

Urea 14.3 mmol/L

Creatinine 82 µmol/L

Glucose 14 mmol/L

He is breathing air.

Blood gas analysis shows:

pH 7.26
 PaCO2 2.57 kPa
 PaO2 9.92 kPa
 HCO3 16.3 mmol/L
 Base excess -14.6 mmol/L
 Lactate 1.6 mmol/L

Which is the most appropriate initial intervention?

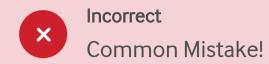
- O Intravenous infusion of 1.26% sodium bicarbonate and potassium replacement
- Encourage patient to breathe into a paper bag
- O Potassium supplementation via a central venous catheter
- Intravenous sliding scale insulin infusion
- Rehydration with 0.9% sodium chloride and correction of blood glucose

Answer question Time elapsed My score Add tags

Question navigator

BMJ On Exam

English French



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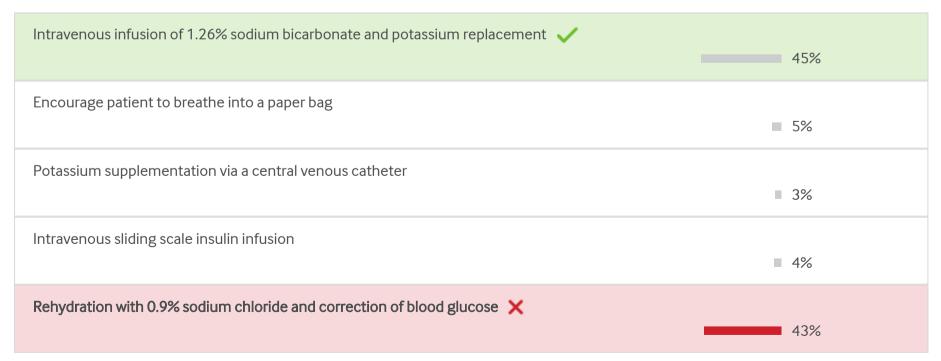
Glucose 14 mmol/L

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pH 7.26
 PaCO2 2.57 kPa
 PaO2 9.92 kPa
 HCO3 16.3 mmol/L
 Base excess -14.6 mmol/L
 Lactate 1.6 mmol/L

Which is the most appropriate initial intervention?



Key learning points 🛭

Endocrinology, Metabolism

• Hyperchloraemic metabolic acidosis is a documented complication of neobladder formation.

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Explanation

The patient has a hyperchloraemic metabolic acidosis with respiratory compensation.

There is also a mild <u>hypernatraemia</u> and hypokalaemia. Lactate concentrations are normal suggesting that the acidosis is not secondary to organ hypoperfusion.

Hyperchloraemic metabolic acidosis is a documented complication of neobladder formation. However, it usually improves with time and is mild. Severe and persistent metabolic acidosis may manifest when patients undergo further surgery for other reasons, as is the case in this patient. Neobladder formation following radical cystectomy or cystoprostatectomy is becoming increasingly more common, and medical staff treating patients with neobladders should recognise and treat metabolic acidosis with intravenous fluids and bicarbonate. Associated electrolyte abnormalities may include hypokalemia, hypocalcaemia, and hypomagnesaemia. Hypokalemia is caused by both intestinal (secretion) and renal losses. This depletion of potassium can be exacerbated by the correction of acidosis.

Rehydrating the patient with 0.9% N. saline is likely to exacerbate the hyperchloraemic state. Potassium supplementation alone via a central venous catheter will not be sufficient treatment. Encouraging the patient to breathe into a paper bag might be a treatment of an acute respiratory alkalosis but inappropriate in this patient. The patient has hyperglycaemia secondary to the metabolic stress response and not ketoacidosis.

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BMJ On Exam

English French Question 81 of 100 Which analyte is a marker of bone formation? Total deoxypyridinoline \bigcirc \bigcirc Hydroxyproline N-telopeptide (NTx) \bigcirc \bigcirc Bone-alkaline phosphatase Tartrate-resistant acid phosphatase \bigcirc Answer question Time elapsed My score Add tags Question navigator

BMJ On Exam

English French



Which analyte is a marker of bone formation?



Key learning points 🛭



Endocrinology

• Metabolic bone disease, bone markers.

Explanation

Bone-alkaline phosphatase is a marker of bone formation, while the others are markers of bone resorption.

Bones are now recognised to be metabolically active, dynamic tissues, rather than merely acting as a skeletal structure and reservoir for mineral ions. Interest in diseases such as osteoporosis has stimulated the search for markers of bone turnover. Markers are useful for prediction of prognosis, prediction of fracture risk, assessing suitability for therapy and monitoring the success of therapy.

Markers of bone resorption are measurable in serum or urine and include

- Telopeptides (NTx and CTx)
- Pyridinium cross-linking molecules
- Tartrate-resistant acid phosphatase (TRAP) and
- Hydroxyproline.

Telopeptides and the pyridinium cross-linking molecules are formed during the hydrolysis of type 1 collagen. TRAP is released by osteoclasts directly but the serum also contains TRAP from other sources, making interpretation difficult. Hydroxyproline is mainly found in collagens and is excreted in the urine when collagen is broken down: this is also non-specific.

Markers of bone formation are measured in serum and include:

- Bone-derived alkaline phosphatase
- Osteocalcin and
- Procollagen type 1 propeptides.

Alkaline phosphatase is useful but not specific to bone.

Osteocalcin is the main non-collagenous protein in bone. During bone formation, osteoblasts make osteocalcin and release some of it into the circulation. Resorption may cause a smaller increase in serum osteocalcin.

Collagen is made from procollagen, with cleavage of N- and C-terminal peptides. These peptides can be measured but are not as sensitive or specific as bone alkaline phosphatase.

9/10/24, 11:32 AM BMJ OnExamination Assessment

Other markers of potential future value: osteoprotegerin and RANK ligand.

Next question

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Suggest Link/Content

BMJ On Exam

English French

Question 82 of 100

A 29-year-old female with a history of thyrotoxicosis which has been treated successfully with antithyroid medication had a relapse of thyrotoxicosis in the third trimester of pregnancy.

She was treated with carbimazole for a short period but was intolerant of this and was therefore discontinued. She is now four weeks post partum and continues to experience tremor, sweats, palpitations, weight loss and flushing. She is also keen to breast feed and has been breast feeding her healthy infant boy.

On examination she has fine tremor of the outstretched hands, a pulse rate of 110/min⁻¹ and lid lag. She has a palpable goitre with an audible bruit. Otherwise she is haemodynamically stable, but eye examination reveals that she has exophthalmos, chemosis and lid-lag.

Her investigations reveal:

Haemoglobin	136 g/L	(120-160)
White cell count	8.2 ×10 ⁹ /L	(4-11)
Platelets	158 ×10 ⁹ /L	(150-400)
TSH	0.04 mU/L	(0.4-5)
Free T4	50 pmol/L	(10-22)
Free T3	18 pmol/L	(5-10)

Which of the following is the most appropriate treatment for this patient's thyrotoxicosis?

SurgeryCarbimazoleRadio-iodine

Propranolol

Propylthiouracil

Answer question

Time elapsed

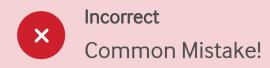
My score

Add tags

Question navigator

BMJ On Exam

English French



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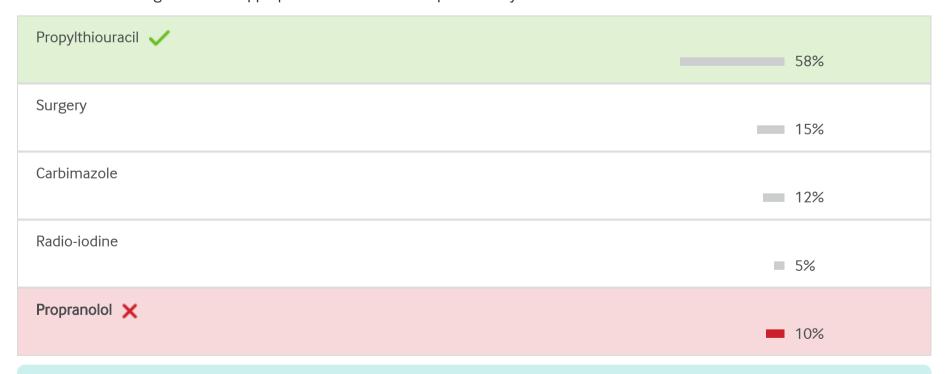
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Platelets	158 ×10 ⁹ /L	(150-400)
TSH	0.04 mU/L	(0.4-5)
Free T4	50 pmol/L	(10-22)
Free T3	18 pmol/L	(5-10)

Which of the following is the most appropriate treatment for this patient's thyrotoxicosis?



Key learning points **Q**

Endocrinology

• Propylthiouracil is best used in breast feeding mothers.

Explanation

This patient has relapsed Graves' thyrotoxicosis, and has a history of previous thyrotoxicosis treated with antithyroid treatment and dysthyroid eye disease, which has now relapsed in pregnancy.

9/10/24, 11:32 AM

BMJ OnExamination Assessment

The patient needs to be rendered euthyroid prior to any definitive therapy. Beta blockers will relieve symptoms but will not treat the thyrotoxicosis.

The previous intolerance of carbimazole makes propylthiouracil an appropriate choice which should be used at the lowest dose to render the patient euthyroid, thus minimising risk of exposure to the infant who is being breast-fed.

The infant's thyroid function should be monitored, although levels in milk are likely too small to affect the infant.

Definitive therapy would involve radio-iodine or surgery the timing of this can be discussed once rendered euthyroid.

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BMJ On Exam

English French

Question 83 of 100

★ High impact question

A 65-year-old female presents with a three month history of generalised aches and pains.

These problems began rather gradually and she has noticed less energy of late. She has otherwise been in good health but has a five year history of hypertension for which she is treated with bendroflumethiazide 2.5 mg daily and more recently she has received lisinopril 5 mg daily. She has received regular blood pressure checks at her GP's clinic. Over the last one year she has also been taking vitamin D supplements as she has been concerned regarding osteoporosis. She stopped taking female HRT approximately five years ago.

Of relevance in her family history was a strong maternal history of osteoporosis. Her mother had a fractured neck of femur at the age of 70 and her maternal aunts had problems with osteoporosis. She is a smoker of 15 pack years having stopped smoking five years ago. She drinks approximately 12 units of alcohol weekly.

On examination she is slightly built with a BMI of 22.2 kg/m² and has a blood pressure of 152/84 mmHg. No specific abnormalities are noted on cardiovascular, respiratory or abdominal examination.

Investigations reveal:

Full blood count normal.

ESR	28 mm/hr	(1-10)
Sodium	133 mmol/L	(137-144)
Potassium	3.3 mmol/L	(3.5-4.9)
Urea	8.8 mmol/L	(2.5-7.5)
Creatinine	92 μmol/L	(60-110)
Calcium	2.72 mmol/L	(2.2-2.6)
Phosphate	0.8 mmol/L	(0.8-1.4)
Free T4	17.8 pmol/L	(10-22)
TSH	0.3 mU/L	(0.5-4.0)
PTH	4 pmol/L	(0.9-5.4)
Urinalysis	Normal	
Chest x ray	Nil reported	

What is the most likely cause of this person's hypercalcaemia? \bigcirc Primary hyperparathyroidism \bigcirc Vitamin D excess \bigcirc Hyperthyroidism \bigcirc Hypercalcaemia of malignancy \bigcirc

Drug induced hypercalcaemia

9/10/24, 11:57 AM

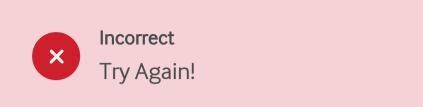
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9/10/24, 11:59 AM BMJ OnExamination Assessment

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English French



★ High impact question

A 65-year-old female presents with a three month history of generalised aches and pains.

These problems began rather gradually and she has noticed less energy of late. She has otherwise been in good health but has a five year history of hypertension for which she is treated with bendroflumethiazide 2.5 mg daily and more recently she has received lisinopril 5 mg daily. She has received regular blood pressure checks at her GP's clinic. Over the last one year she has also been taking vitamin D supplements as she has been concerned regarding osteoporosis. She stopped taking female HRT approximately five years ago.

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Free T4	17.8 pmol/L	(10-22)
TSH	0.3 mU/L	(0.5-4.0)
PTH	4 pmol/L	(0.9-5.4)
Urinalysis	Normal	
Chest x ray	Nil reported	

What is the most likely cause of this person's hypercalcaemia?

Primary hyperparathyroidism 🗸	29%
Vitamin D excess	30%
Hyperthyroidism	6 %



Key learning points 🛭

Endocrinology

• Inappropriately normal PTH in the face of hypercalcaemia is diagnostic of primary hyperparathyroidism

Explanation

This patient has mild hypercalcaemia which may not be responsible for her symptoms and certainly there are many possible causes.

She appears to have biochemical and subclinical hyperthyroidism, she is taking bendroflumethiazide and also takes vitamin D, all of which may cause hypercalcaemia.

But the important investigation is the parathyroid hormone (PTH). This is within the normal range and therefore in the context of her mild hypercalcaemia is inappropriately normal as it should, by homeostatic mechanisms, be suppressed if the hypercalcaemia were a consequence of another disorder. Thus the diagnosis is primary hyperparathyroidism.

Similarly the lowish phosphate concentration is typical of PHPTH.

With regard to the <u>hyponatraemia</u> and mild hypokalaemia this is likely to be explained by the bendroflumethiazide.

See: http://www.gpnotebook.co.uk/simplepage.cfm?ID=x20120702211632871479

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BMJ On Exam

English French

Question 84 of 100

★ High impact question

A 62-year-old man presents to the clinic complaining of pain over his left hip and pelvis.

He has a history of benign prostatic hypertrophy for which he takes finasteride. General examination is unremarkable. He walks with a limp, hip flexion on the left is limited by bony pain.

Investigations show:

Haemoglobin	117 g/L	(135-177)
White cell count	8.1 ×10 ⁹ /L	(4-11)
Platelets	196 ×10 ⁹ /L	(150-400)
Sodium	139 mmol/L	(135-146)
Potassium	4.2 mmol/L	(3.5-5)
Creatinine	112 μmol/L	(79-118)
Alkaline phosphatase	322 U/L	(39-117)
Calcium	2.3 mmol/L	(2.20-2.61)

Which of the following treatments is most likely to be effective?

 \bigcirc Cyproterone \bigcirc Calcium and vitamin D \bigcirc Risedronate \bigcirc

Denosumab

 \bigcirc Teriparatide

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9/10/24, 12:00 PM BMJ OnExamination Assessment

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★ High impact question

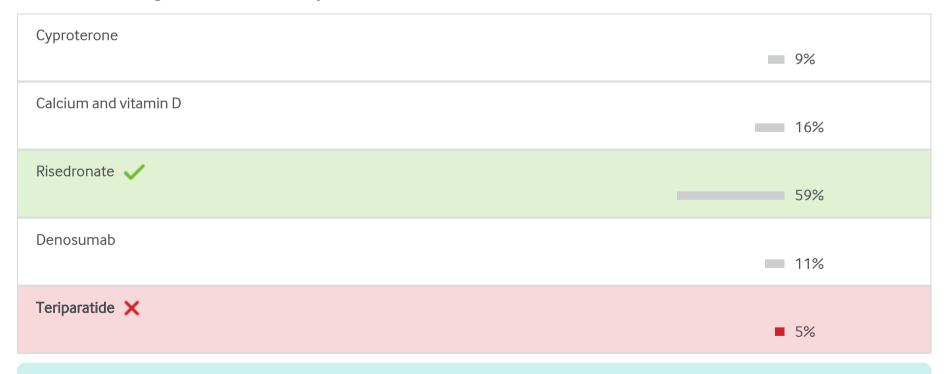
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Creatinine	112 μmol/L	(79-118)
Alkaline phosphatase	322 U/L	(39-117)
Calcium	2.3 mmol/L	(2.20-2.61)

Which of the following treatments is most likely to be effective?



Endocrinology

• Bisphosphonates are proven to reduce symptoms of pain and serum alkaline phosphatase which acts as a marker of disease activity in Paget's disease.

Explanation

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This patient's symptoms and raised alkaline phosphatase in the presence of a normal calcium fit best with a diagnosis of Paget's disease. Bisphosphonates are proven to reduce symptoms of pain and serum alkaline phosphatase which acts as a marker of disease activity.

Calcium and vitamin D, denosumab and teriparatide are all treatment options for osteoporosis.

Cyproterone acetate is an anti-androgen which may have a role in the treatment of prostatic carcinoma.

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9/10/24, 12:00 PM BMJ OnExamination Assessment

BMJ On Exam

English French

Question 85 of 100

☆ High impact question

A 42-year-old male presents with impotence and reduced libido of six months duration.

He has been married for 15 years and has two children. He smokes five cigarettes per day and drinks approximately 12 units of alcohol weekly.

Examination reveals an obese male who is phenotypically normal with normal secondary sexual characteristics.

Investigations are as follows:

НЬ	134 g/L	(130-180)
WCC	6 ×10 ⁹ /L	(4-11)
Platelets	210 ×10 ⁹ /L	(150-400)
Electrolytes	Normal	
Fasting glucose	5.6 mmol/L	(3.0-6.0)
LFTs	Normal	
T4	12.7 pmol/L	(10-22)
TSH	2.1 mU/L	(0.4-5)
Prolactin	259 mU/L	(<450)
Testosterone	6.6 nmol/L	(9-30)
LH	23.7 mU/L	(4-8)
FSH	18.1 mU/L	(4-10)

Which of the following investigations would you select for the further investigation of this patient?

MRI of the pituitary
 Ferritin
 Prostate specific antigen
 Ultrasound examination of the testes
 Karyotype

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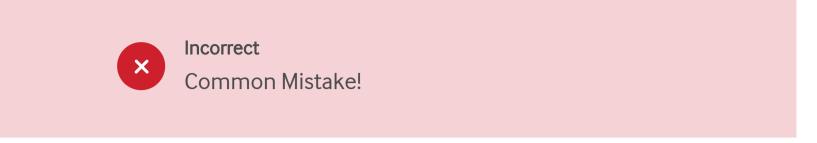
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☆ High impact question

A 42-year-old male presents with impotence and reduced libido of six months duration.

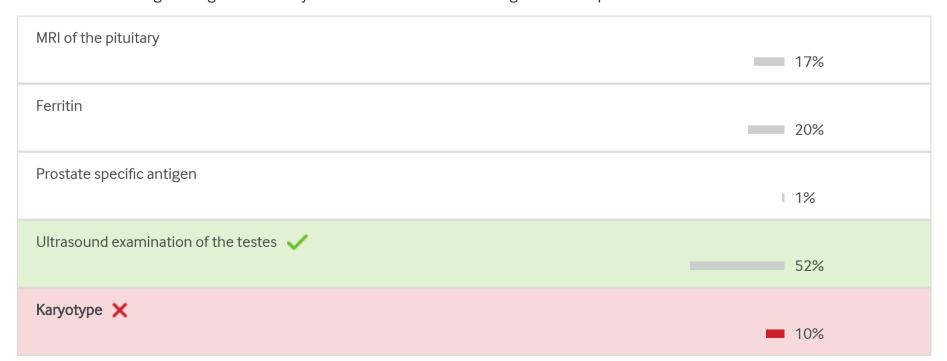
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Prolactin	259 mU/L	(<450)
Testosterone	6.6 nmol/L	(9-30)
LH	23.7 mU/L	(4-8)
FSH		

Which of the following investigations would you select for the further investigation of this patient?



Endocrinology

• Primary hypogonadism is associated with low testosterone and sperm count with appropriately elevated LH & FSH.

Explanation

This patient has hypergonadotrophic hypogonadism suggesting primary gonadal failure. The patient has primary hypogonadism if the serum testosterone concentration and the sperm count are below normal and the serum LH and FSH concentrations are above normal.

The patient has secondary hypogonadism if the serum testosterone concentration and the sperm count are subnormal and the serum LH and FSH concentrations are normal or reduced.

Primary hypogonadism is more likely to be associated with a decrease in sperm production than in testosterone production. Although many testicular diseases damage both the seminiferous tubules and the Leydig cells, they usually damage the seminiferous tubules to a greater degree. As a consequence, the sperm count may be low, and the serum FSH concentration normal or high, yet the serum testosterone concentration remains normal. In contrast, in secondary hypogonadism, there is a proportionate reduction in testosterone and sperm production.

Testicular tumour, infiltration or idiopathic failure may be suspected and an ultrasonic evaluation of the testes is the most appropriate investigation.

<u>Haemochromatosis</u> usually causes pituitary dysfunction and MRI of the pituitary is not indicated as the pituitary is behaving appropriately.

A karyotype for Klinefelter's is not necessary in a patient with two children and mosaicism would be very unusual.

Causes of primary hypogonadism in males can include congenital abnormalities and acquired diseases.

Congenital abnormalities:

- Klinefelter syndrome (and other chromosomal abnormalities)
- Mutation in the FSH and LH receptor genes
- Cryptorchidism
- Varicocele
- Disorders of androgen synthesis, and
- Myotonic dystrophy.

Acquired diseases:

- Infections (especially mumps)
- Radiation
- Alkylating agents
- Ketoconazole
- Glucocorticoids
- Environmental toxins
- Trauma
- Testicular torsion
- Autoimmune damage
- Chronic systemic illnesses
- Hepatic cirrhosis
- Chronic renal failure
- AIDS, and
- Idiopathic.

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English French

Question 86 of 100

A 22-year-old male is referred by his general practitioner due to problems related to his sex life. He has recently entered into his first sexual relationship but has problems achieving an erection and is perturbed by poor sexual development.

He describes his pubertal development as poor. He is aware of a paucity of pubic hair and he has been embarrassed about his gonadal development. He started to shave at the age of 18 but shaves only twice weekly. Otherwise he is quite fit and active and works as a labourer on a building site and has no formal qualifications. He takes no medication and drinks 20 units of alcohol weekly but mostly on weekends. He has one younger brother.

Examination reveals a phenotypically normal male, who is tall but lean with a BMI of 21.2 kg/m². He has little beard growth, fine skin, a paucity of body hair and scanty pubic hair. His penile length is approximately 6 cm with testicular volumes of approximately 6-7 ml bilaterally (normal 10-15 ml). Cardiovascular, respiratory and abdominal examination are all normal. Fundal examination is normal and he has normal visual fields.

Investigations show:

Plasma testosterone concentration	6.2 nmol/L	(10-30)
LH	20.2 mU/L	(2-10)
FSH	22.2 mU/L	(2-10)
Prolactin	433 mU/L	(50-500)
Free T ₄	12.6 pmol/L	(10-22)
TSH	2.3 mU/L	(0.4-5)

What are the chances of his brother developing this disorder?

- O 100%
- O 50%
- O 33%
- O 25%
- O <1%

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9/10/24, 12:00 PM **BMJ OnExamination Assessment**

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A 22-year-old male is referred by his general practitioner due to problems related to his sex life. He has recently entered into his first sexual relationship but has problems achieving an erection and is perturbed by poor sexual development.

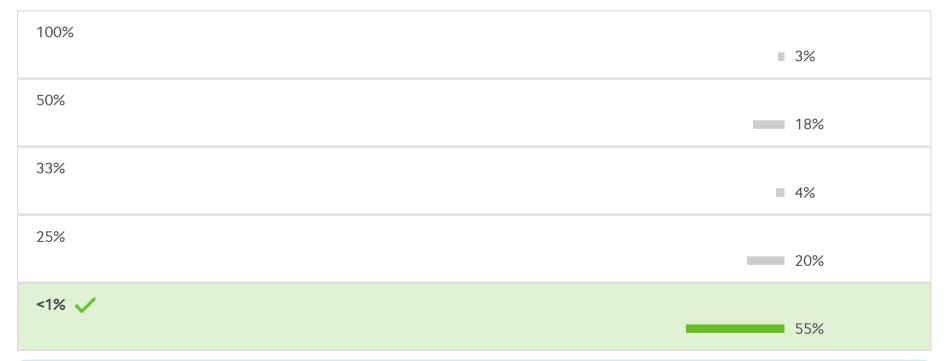
He describes his pubertal development as poor. He is aware of a paucity of pubic hair and he has been embarrassed about his gonadal development. He started to shave at the age of 18 but shaves only twice weekly. Otherwise he is quite fit and active and works as a labourer on a building site and has no formal qualifications. He takes no medication and drinks 20 units of alcohol weekly but mostly on weekends. He has one younger brother.

Examination reveals a phenotypically normal male, who is tall but lean with a BMI of 21.2 kg/m 2 . He has little beard growth, fine skin, a paucity of body hair and scanty pubic hair. His penile length is approximately 6 cm with testicular volumes of approximately 6-7 ml bilaterally (normal 10-15 ml). Cardiovascular, respiratory and abdominal examination are all normal. Fundal examination is normal and he has normal visual fields.

Investigations show:

Plasma testosterone concentration	6.2 nmol/L	(10-30)
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Free T ₄	12.6 pmol/L	(10-22)
TSH	2.3 mU/L	(0.4-5)

What are the chances of his brother developing this disorder?



Key learning points 🛛



Endocrinology, Genetics

• Klinefelters does not have a genetic pattern of inheritance

Explanation

9/10/24, 12:00 PM

BMJ OnExamination Assessment

This patient has Klinefelter's syndrome as suggested by the hypergonadotrophic hypogonadism, poor secondary sexual characteristics plus tall stature and suggested poor academic record.

This is due to 47XXY and has no specific genetic pattern of inheritance.

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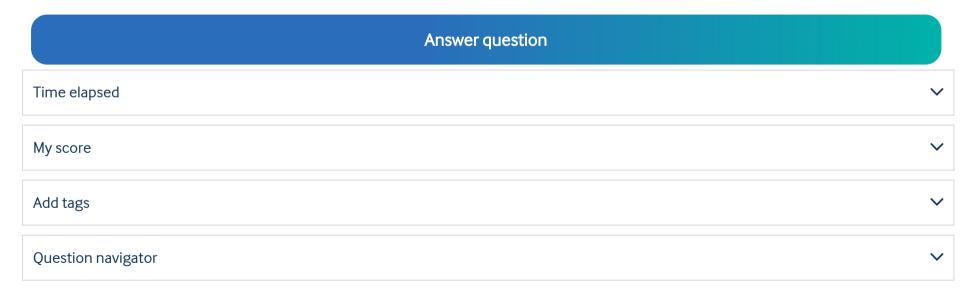
Question 87 of 100

This 72-year-old female presents with lethargy, weakness with increasing confusion over the last three months. She has noticed a weight gain of approximately 3 kg over the last two months and her relatives comment that she has found increasing problems with falls.



Which of the following antibodies is most likely to be detectable?

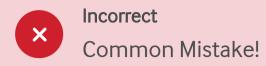
- Anti-thyroglobulin antibody
- O Anti-TSH receptor antibody
- Anti-adrenal 21 hydroxylase antibodies
- O Anti-thyroid peroxidase antibodies
- O Anti-intrinsic factor antibodies



9/10/24, 12:03 PM

BMJ On Exam

English French



This 72-year-old female presents with lethargy, weakness with increasing confusion over the last three months. She has noticed a weight gain of approximately 3 kg over the last two months and her relatives comment that she has found increasing problems with falls.



Which of the following antibodies is most likely to be detectable?

Anti-thyroglobulin antibody	12%
Anti-TSH receptor antibody	14%
Anti-adrenal 21 hydroxylase antibodies	17%
Anti-thyroid peroxidase antibodies 🗸	52%
Anti-intrinsic factor antibodies 🗶	■ 5%

Key learning points 🛭



Endocrinology, Immunology, Photographic

• AntiTPO antibodies are present in 10% females without thyroid pathology

Explanation

The patient has a history compatible with, and an appearance suggestive of hypothyroidism.

The most likely cause of this would be Hashimoto's thyroiditis with microsomal antibodies expected.

Antithyroid peroxidase antibodies (previously known as thyroid microsome autoantibodies) are present at high titre in Hashimoto's thyroiditis. They are present at low titre in Graves' disease, De Quervain's thyroiditis, and in 8% of males and 10% of females without thyroid disease.

9/10/24, 12:03 PM

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Thyroglobulin antibody is less likely to be present.

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BMJ On Exam

English French

Question 88 of 100

☆ High impact question

This patient has hypertension and is an insulin dependent diabetic. She developed this painless lesion over several weeks.



What is the diagnosis?

- O Pre-tibial myxoedema
- O Tuberculoid leprosy
- Morphoea
- $\bigcirc \qquad \text{Necrobiosis lipoidica dibeticorum}$
- O Pyoderma gangrenosum

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9/10/24, 12:04 PM

BMJ On Exam

English French



☆ High impact question

This patient has hypertension and is an insulin dependent diabetic. She developed this painless lesion over several weeks.



What is the diagnosis?



Key learning points 🛭

Dermatology, Diabetes, Pharmacology, Photographic

• Necrobiosis lipoidica is commonly associated with diabetes and is painless lesion due to collagen degeneration.

Explanation

Necrobiosis lipoidica is a disorder of collagen degeneration with a granulomatous response, thickening of blood vessel walls, and fat deposition.

The exact cause of necrobiosis lipoidica is unknown, but the leading theory of necrobiosis lipoidica has focused on diabetic microangiopathy.

9/10/24, 12:04 PM BMJ OnExamination Assessment

Necrobiosis is often mistaken for <u>eczema</u> but rather than responding to steroids may actually deteriorate.

Occasionally ulceration of the lesion may occur.

Necrobiosis is typically painless.

Morphoea is localised scleroderma and more atrophic or 'ivory' in appearance.

Next question

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BMJ On Exam

English French

Question 89 of 100

A 58-year-old lady with type II diabetes mellitus and chronic renal failure on haemodialysis presents with unstable angina. She currently uses twice daily insulin for glycaemic control but control has been poor of late.

Investigations:

Haemoglobin	86 g/L	(115-165)
MCV	84 fL	(80-96)
Platelets	198 ×10 ⁹ /L	(150-400)
White cell Count	6.7 ×10 ⁹ /L	(4-11)
HbA _{1c}	90 mmol/mol	(20-46)
	10.4%	(3.8-6.4)

What is the most appropriate treatment?

- Oral ferrous sulphate
- O Subcutaneous erythropoietin
- $\bigcirc \qquad \text{Blood transfusion with two units of packed red cells}$
- O Subcutaneous erythropoietin and intravenous iron
- O Intravenous iron infusion

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English French

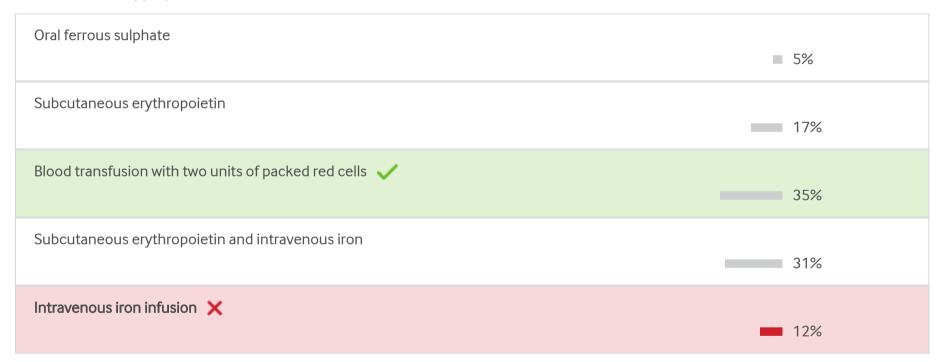


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MCV	84 fL	(80-96)
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White cell Count	6.7 ×10 ⁹ /L	(4-11)
HbA _{1c}	90 mmol/mol	(20-46)
	10.4%	(3.8-6.4)

What is the most appropriate treatment?



Key learning points 🛭



Diabetes, Haematology, Nephrology

• K-DOQI guidelines suggest maintaining Hb >110 g/L in CRF

Explanation

The aim in all patients with chronic renal failure is to maintain the haemoglobin concentration above 110 g/L (K-DOQI guidelines). It is important to correct anaemia, as it leads to ventricular hypertrophy, which increases the cardiovascular morbidity and mortality.

This patient is exhibiting signs of severe anaemia, i.e. angina. This may or may not be related to underlying coronary artery disease. The treatment of choice is an urgent blood transfusion, to treat her ongoing symptoms.

If this patient did not have symptoms the correct answer would be subcutaneous erythropoietin and intravenous iron.

IV iron therapy should be given (following a small IV test dose, to exclude <u>anaphylaxis</u>) and SC erythropoietin, to enhance erythropoiesis and increase the haemoglobin concentration.

9/10/24, 12:04 PM BMJ OnExamination Assessment

If the patient did not respond to this dual regime, she should be investigated for sepsis, chronic blood loss, non-compliance of treatment, or severe hyperparathyroidism (which can cause marrow fibrosis).

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BMJ On Exam

English French

Question 90 of 100

Which of the following patients has results suggesting a diagnosis of diabetes insipidus?

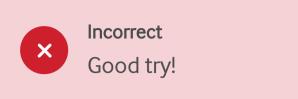
Tests	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Reference range
Serum Na	150	136	128	128	128	135-145 mmol/L
Urine Na	18	35	12	50	40	
Serum osmolality	305	275	260	258	266	280-290 mOsm/kg
Urine osmolality	100	160	80	150	100	
TSH	2.0	12.5	4.2	2.0	3.5	1.0-4.5 mIU/L
9am cortisol	300	450	290	485	120	270-650 nmol/L

- O Patient 1
- O Patient 4
- O Patient 3
- O Patient 5
- O Patient 2

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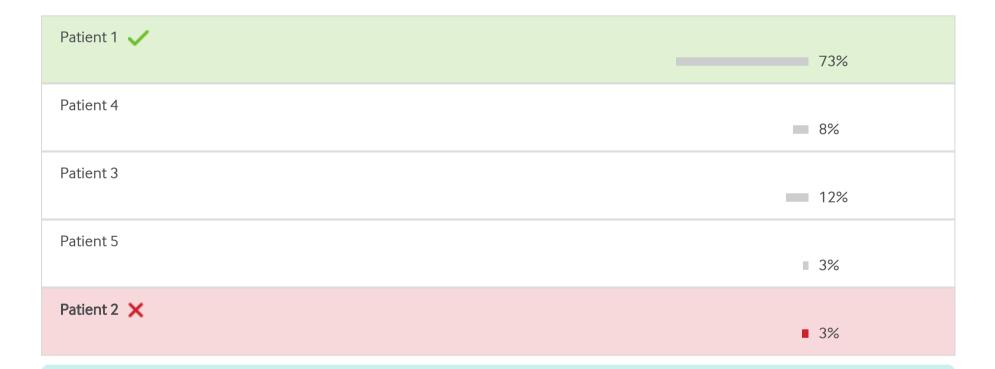
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English French



Which of the following patients has results suggesting a diagnosis of diabetes insipidus?

Tests	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Reference range
Serum Na	150	136	128	128	128	135-145 mmol/L
Urine Na	18	35	12	50	40	
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Urine osmolality	100	160	80	150	100	
TSH	2.0	12.5	4.2	2.0	3.5	1.0-4.5 mIU/L
9am cortisol	300	450	290	485	120	270-650 nmol/L



Endocrinology

• Diabetes insipidus

Explanation

Patient 1 has results suggestive of diabetes insipidus.

Patient 2 has results suggestive of primary hypothyroidism.

Patient 3 has results suggestive of psychogenic polydipsia.

Patient 4 has results suggestive of SIADH with inappropriate loss of Na and osmoles in the urine.

Patient 5 has results suggestive of Addison's disease.

In <u>diabetes insipidus</u> (DI), there is a failure of production, secretion or action of antidiuretic hormone (ADH). This means there are inadequate aquaporin channels and water cannot escape from the collecting duct to concentrate the urine. The urine remains dilute.

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Large volumes of urine are excreted to enable the body to clear its daily solute/toxin excretion requirements. Thus there is copious production of dilute urine. If water intake is limited, as occurs in the water deprivation test, the patient will be unable to replace the water lost and the serum osmolality can become dangerously high. The urine will fail to become concentrated even with prolonged water deprivation.

Next question

DI can be cranial (failed production or secretion of ADH) or nephrogenic (failed action of ADH).

In the water deprivation test, giving synthetic ADH to a patient with cranial DI will allow the urine to become concentrated.

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Question 91 of 100

★ High impact question

A 66-year-old patient with obesity and hypertension has investigations as follows:

Test	Result	Range
Low-dose dexamethasone suppression test	Cortisol 75 nmol/L	(<50)
Urine free cortisol	510 nmol/L	(<248)
Synacthen test	Baseline: 850 nmol/L	(>280 at 9 am)
	30 min: 990 nmol/L	(>450 at 30 mins)
ACTH	27 pmol/L	(<19)
Aldosterone	450 pmol/L	(100-800 random sample/upright)

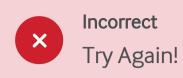
What is the most likely diagnosis?

- Cushing's syndrome adrenal origin
- O Addison's disease
- Cushing's disease
- Conn's syndrome
- O Long term dexamethasone treatment

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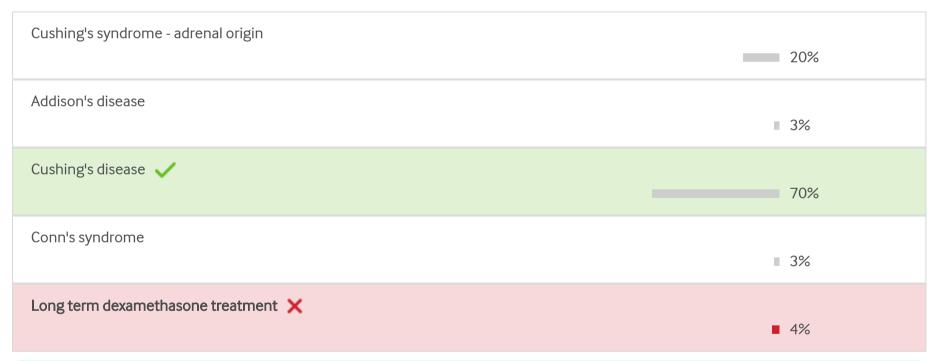


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ACTH	27 pmol/L	(<19)
Aldosterone	450 pmol/L	(100-800 random sample/upright)

What is the most likely diagnosis?



Endocrinology

• Adrenal disease, Cushing's syndrome.

Explanation

These test results are suggestive of Cushing's syndrome due to pituitary origin, thus the raised adrenocorticotropic hormone (ACTH). This is called Cushing's disease. Adrenal Cushing's would typically be associated with a suppressed ACTH.

Classical symptoms of Cushing's syndrome include:

- hypertension
- adiposity
- abdominal straie

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- proximal muscle weakness
- menstrual irregularities, and
- impaired glucose homeostasis or diabetes.

Cushing's syndrome can be challenging to diagnose as it often requires several different diagnostic tests. The 24 hour urine free cortisol (UFC) is a good initial screening test. Borderline results can occur with stress. If the UFC is elevated, consider repeating it and consider the overnight or low-dose dexamethasone suppression tests.

The low dose dexamethasone suppression test is more reliable than the overnight test. If the cortisol is suppressed to less than 50 nmol/L, Cushing's syndrome is excluded.

Next question

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Question 92 of 100

A 56-year-old male with type 2 diabetes for 15 years attends the diabetic clinic for annual review.

He has been treated with insulin for 5 years and tells you his blood sugar readings have been steady with fasting readings of less than 7.0 prebreakfast. He does complain of increased lethargy however for approximately 6 months.

There are no symptoms suggestive of angina or intermittent claudication, however he reports paraesthesia affecting the lower limbs, which is worse at night. He attends annually for digital imaging of the retina and is reported to have changes of background diabetic retinopathy in both eyes. He has previously documented microalbuminuria. There is no complaint of erectile dysfunction.

On examination his weight is 80 kg and pulse rate is 72/min with a blood pressure of 145/85 mmHg. He appears clinically euthyroid with no palpable goitre. S1S2 are audible with no added sounds or murmurs; his chest is clear to auscultation and his abdomen is soft with no organomegaly. He has diminished 128 Hz tuning fork vibration and 10 g monofilament sensation in both of his feet with intact pedal pulses and no evidence of ulceration. Fasting blood glucose is 7.8 mmol/L (3.0-6.0).

His pre-clinic results are as follows:

HbA _{1c}	60 mmol/mol	(20-46)
	7.6%	(3.8-6.4)
Sodium	140 mmol/L	(137-144)
Potassium	4.0 mmol/L	(3.5-4.9)
Urea	7.8 mmol/L	(2.5-7.5)
Creatinine	135 μmol/L	(60-110)
Liver function tests	Normal	-
Haemoglobin	110 g/L	(130-180)
MCV	83.0 fL	(80-96)
White cell count	10 ×10 ⁹ /L	(4-11)
Platelets	205 ×10 ⁹ /L	(150-400)
Total cholesterol	4.9 mmol/L	(<5.2)
HDL cholesterol	1.0 mmol/L	(0.8-1.2)
LDL cholesterol	2.5 mmol/L	(<3.5)
Triglycerides	2.2 mmol/L	(0.8-1.5)
eGFR	50 ml/min/1.73 m ²	-
Microalbumin screen	45 mg/mmol	(<2.5)

Which of the following is the most appropriate treatment you would next suggest this man?

O Add ramipril 10 mg/day

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0	Addition of metformin 500 mg tds
0	Add irbesartan 150 mg/day
\circ	Add pioglitazone 30 mg/day
0	Increase simvastatin from 40-80 mg/day

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English French



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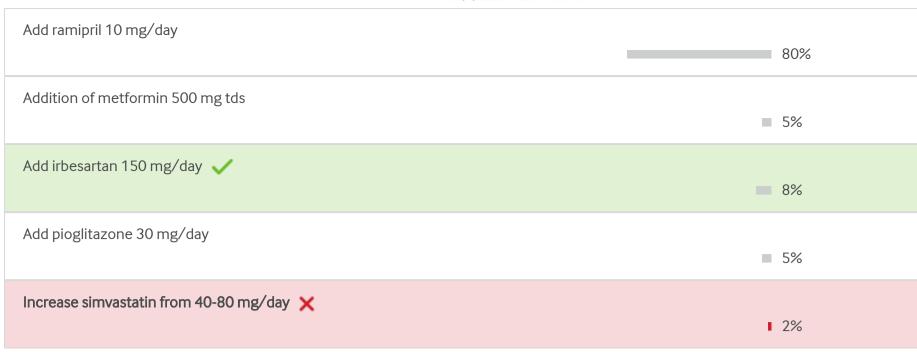
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eGFR	50 ml/min/1.73 m ²	-
Microalbumin screen	45 mg/mmol	(<2.5)

Which of the following is the most appropriate treatment you would next suggest this man?

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Diabetes, Endocrinology, Nephrology, Pharmacology

• ACEi is first line blood pressure treatment in diabetes (but needs to be gradually titrated to avoid side-effects)

Explanation

This patient has type 2 diabetes complicated by the microvascular complications of diabetes. He has incipient diabetic nephropathy as evidenced by microalbuminuria, hypertension and a reduction in estimated GFR. The risk of progression to overt nephropathy is high.

There is good evidence that control of blood pressure in patients with type 2 diabetes and moderately increased albuminuria is beneficial. We treat with either an ACE inhibitor or an angiotensin receptor blocker (ARB) to slow or prevent progression to severely increased albuminuria and overt diabetic nephropathy. Ideally start with an ACE. However the dose of ramipril stated in the answer is too high as starting dose. It may induce side effects such as postural hypotension, angioedema and cough. For these reasons the dose is slowly titrated up.

There is evidence for angiotensin converting enzyme (ACE) inhibitors such as ramipril in type 1 diabetes. However the starting dose is usually lower and titrated up as per the patient is able to tolerate.

The LDL-C cholesterol level is reasonable, however a target of <2.0 is more likely to be achieved with a more potent statin such as atorvastatin or rosuvastatin rather than increasing the dose of simvastatin.

HbA_{1c} is above target however metformin is relatively contraindicated with a eGFR below 60 due to risk of lactic acidosis and pioglitazone would not be the ideal choice given the possibility of exacerbating fluid retention.

Moderation of diet and lifestyle changes as well and maybe increasing insulin would be the means of improving glycaemic control.

Next question

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Question 93 of 100

A 52-year-old male who has a five year history of type 2 diabetes mellitus is admitted to a village hospital with chest pain.

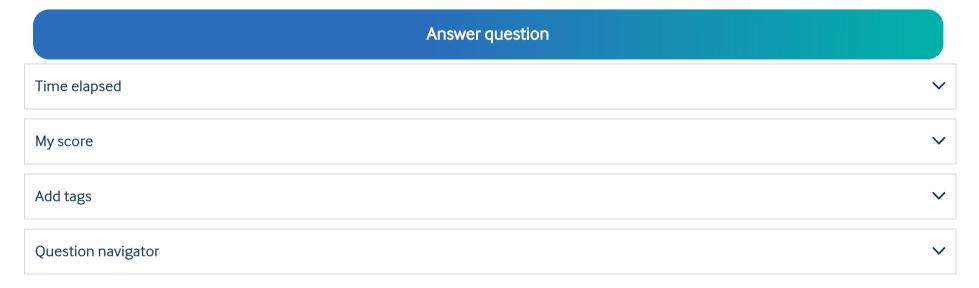
His usual drug therapy includes metformin 500 mg tds and he also takes bendroflumethiazide 2.5 mg daily for hypertension.

On examination, he is obese with a BMI of 32 kg/m 2 , has a pulse of 88 beats per minute and a blood pressure of 148/92 mmHg. His ECG shows ST elevation in leads II, III and aVF.

Rescue PCI is not available and so he receives tenecteplase and his BM glucose concentrations show values between 7-12 mmol/L. His plasma glucose concentration obtained from the laboratory is 10.8 mmol/L (3.0-6.0).

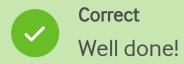
What is the most appropriate treatment for his glycaemic control?

- O Add gliclazide to metformin
- O Continue current dose of metformin
- Increase metformin
- O Change metformin to gliclazide
- O Commence intravenous insulin infusion and stop metformin



BMJ On Exam

English French



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His usual drug therapy includes metformin 500 mg tds and he also takes bendroflumethiazide 2.5 mg daily for hypertension.

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What is the most appropriate treatment for his glycaemic control?

Add gliclazide to metformin	■ 5%
Continue current dose of metformin	11%
Increase metformin	4 %
Change metformin to gliclazide	■ 4%
Commence intravenous insulin infusion and stop metformin	76%

Key learning points 🛭

Cardiology, Diabetes

• Metformin is contraindicated immediately following MI due to tissue hypoxia which is a risk factor for the development of lactic acidosis.

Explanation

The Diabetes and Insulin-Glucose Infusion in Acute Myocardial Infarction (DIGAMI) study demonstrated significant reductions in mortality in subjects with diabetes and myocardial infarction (MI) treated with IV insulin infusion (followed by three months of sc insulin) compared with conventional therapy with their oral hypoglycaemic agents.

Although DIGAMI II cast doubt on the requirement for prolonged insulin therapy, in this particular patient with an acute MI and stress insult, the most appropriate therapy is IV insulin infusion as the initial therapy.

Clearly continuation of the metformin would not be appropriate in this context in the initial stages, due to the increased risk of lactic acidosis.

Reference:

- 1. Malmberg K. Role of insulin-glucose infusion in outcomes after acute myocardial infarction: the diabetes and insulin-glucose infusion in acute myocardial infarction (DIGAMI) study. Endocr Pract. 2004;10:13-6.
- 2. Malmberg K, Rydén L, Wedel H, et al. <u>Intense metabolic control by means of insulin in patients with diabetes mellitus and acute myocardial infarction (DIGAMI 2): effects on mortality and morbidity.</u> *Eur Heart J.* 2005;26:650-61.

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English French

Question 94 of 100

A 30-year-old female presents with tiredness and poor appetite.

She delivered a healthy baby 2 months ago and is currently breastfeeding. She required iron for anaemia during the pregnancy but is normally well and takes no other medications. There is no family history of note.

On examination she has a BMI of 24 kg/m^2 , a pulse of 96 beats per minute and a blood pressure of 124/70 mmHg. A small goitre is palpable but no bruit is audible. She has a slight tremor of her outstretched hands. Cardiovascular, respiratory and abdominal examinations are normal.

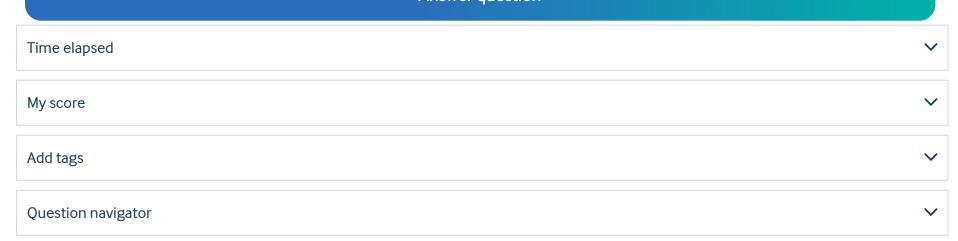
Investigations show:

Haemoglobin	105 g/L	(115-165)
ESR (Westergren)	21 mm/1st hour	(0-20)
Serum sodium	136 mmol/L	(137-144)
Serum potassium	3.7 mmol/L	(3.5-4.9)
Serum urea	5.6 mmol/L	(2.5-7.5)
Serum creatinine	75 μmol/L	(60-110)
Random plasma glucose	5.2 mmol/L	(<11.1)
Serum T4	28.2 pmol/L	(10-22)
Serum T3	6.8 pmol/L	(5-10)
TSH	0.05 mU/L	(0.4-5.0)

What is the most likely diagnosis?

- O Hashimoto's thyrotoxicosis
- O De Quervain's thyroiditis
- O Toxic nodular goitre
- O Postpartum thryoiditis
- O Graves' disease

Answer question



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BMJ On Exam

English French



A 30-year-old female presents with tiredness and poor appetite.

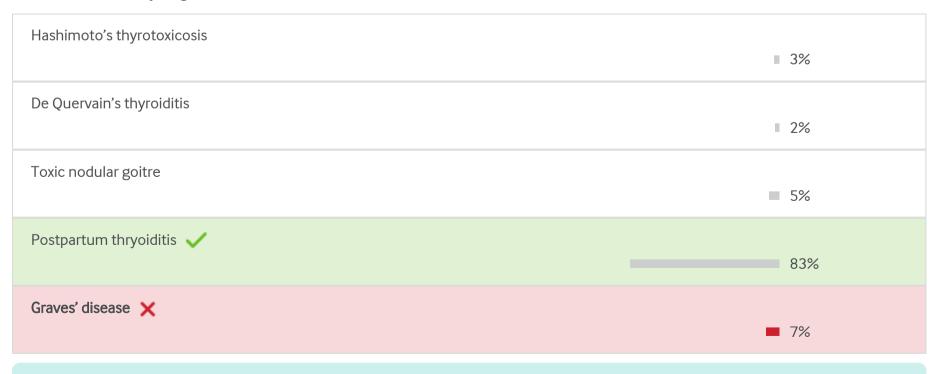
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75 μmol/L	(60-110)
5.2 mmol/L	(<11.1)
28.2 pmol/L	(10-22)
6.8 pmol/L	(5-10)
0.05 mU/L	(0.4-5.0)
	21 mm/1st hour 136 mmol/L 3.7 mmol/L 5.6 mmol/L 75 μmol/L 5.2 mmol/L 28.2 pmol/L 6.8 pmol/L

What is the most likely diagnosis?



Key learning points 🛭

Endocrinology

ALGrawany

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• Post-partum thyroiditis is usually transient, with hyperthyroidism 2-6 months post-partum and then hypothyroidism. It rarely needs treatment.

Explanation

Postpartum thyroiditis occurs in approximately 5% of females and is associated with transient hyperthyroidism usually two to six months postpartum followed by hypothyroidism which also usually resolves but permanent hypothyroidism may occur.

The exact aetiology is unknown but lymphocytic infiltration of the thyroid is typical, suggesting auto-immunity.

Treatment for the hyperthyroidism is usually conservative as symptoms could resolve but, if required, beta-blockers are adequate.

De Quervain's thyroiditis is associated with tender enlargement of the thyroid and marked constitutional symptoms - weight loss in particular and thyroid function tests are often normal. A markedly elevated erythrocyte sedimentation rate would also be expected and the mild elevation in this patient may be explained by her mild anaemia.

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BMJ On Exam

English French

Question 95 of 100

☆ High impact question

A 17-year-old male is investigated for short stature.

He has a previous diagnosis of slipped femoral epiphysis diagnosed at the age of 11.

He presented with this disorder at this age with pain in the hip and limp. This was treated by the orthopaedic surgeons with nonsurgical containment of the femoral head in the acetabulum using casts. However, his younger brother has also recently been diagnosed with bilateral slipped femoral capital epiphysis and is being treated by the orthopaedic surgeons at the age of 12.

There is nothing else of note in family history and his progress at school and development are otherwise fine.

On examination he is on the 12th centile for height, a BMI of 30 and has normal pubertal development. His blood pressure is 108/70 mmHg and he has a pulse of 90 beats per minute. No abnormalities are noted on examination of the chest, heart and abdomen.

Investigations reveal:

Haemoglobin	128 g/L	(130-180)
White cell count	5.4 ×10 ⁹ /L	(4-11)
Platelets	143 ×10 ⁹ /L	(150-400)
Serum Sodium	133 mmol/L	(137-144)
Serum Potassium	4.2 mmol/L	(3.5-4.9)
Serum Creatinine	96 μmol/L	(60-110)
Serum Calcium	2.02 mmol/L	(2.2-2.6)
Serum Phosphate	1.8 mmol/L	(0.8-1.4)
PTH	15.8 pmol/L	(0.9-5.4)

Which of the following is the most likely explanation of this boy's presentation?

- O Vitamin D resistant osteomalacia
- Pseudohypoparathyroidism
- O Primary hypoadrenalism
- Renal osteodystrophy

O Coeliac disease

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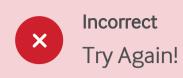
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Serum Phosphate	1.8 mmol/L	(0.8-1.4)
PTH	15.8 pmol/L	(0.9-5.4)

Which of the following is the most likely explanation of this boy's presentation?

Vitamin D resistant osteomalacia	38%
Pseudohypoparathyroidism 🗸	47%
Primary hypoadrenalism	■ 4%
Renal osteodystrophy	8 %
Coeliac disease X	■ 3%



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Endocrinology, Genetics, Sciences (Clinical)

• Psuedohypoparathyroidism is associated with slipped epiphyseal plate in childhood.

Explanation

This young boy has short stature and previous history of slipped femoral epiphysis.

The investigations reveal a hypocalcaemia and a hyperphosphataemia suggesting a hypoparathyroidism (both calcium and phosphate would be expected to be low in vitamin D deficiency and hypophosphataemia in vitamin D resistant rickets) yet the raised parathyroid hormone (PTH) concentration is elevated indicating pseudohypoparathyroidism.

This is a group of disorders characterised by insensitivity to PTH.

It is an autosomal dominant condition and is due to defects in the gene (GNAS1) encoding the alpha subunit of the stimulatory G protein (Gsa) contributing to at least three different forms of the disease: the severity of the condition may vary with generations.

The constellation of findings includes:

- short stature
- stocky habitus
- obesity
- developmental delay
- round face
- dental hypoplasia
- brachymetacarpals
- brachymetatarsals, and
- soft tissue calcification/ossification.

The diagnosis is confirmed with genetic analysis and with a failure of cyclic adenosine monophosphate (cAMP) rise following PTH.

Slipped femoral epiphysis is a recognised feature.

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Question 96 of 100

☆ High impact question

A 20-year-old female presents with primary amenorrhoea. As a child she underwent repair of a cleft palate.

Examination reveals poor secondary sexual characteristics with a BMI of 22.4.

Investigations reveal:

Oestradiol concentration 68 pmol/L (130-450)

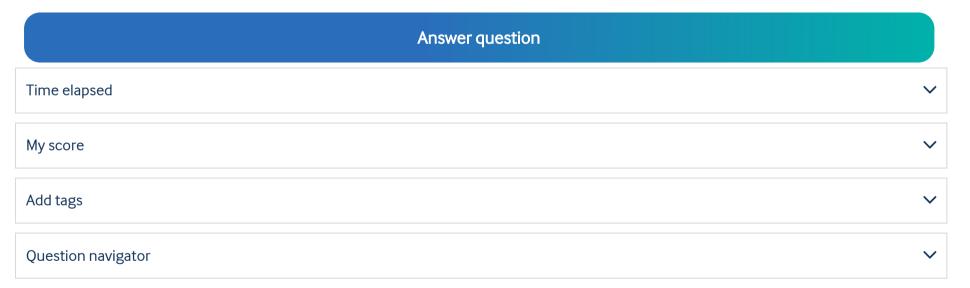
LH 3.2 mU/L (3-10)

FSH 4.2 mU/L (3-10)

Prolactin concentration 350 mU/L (50-450)

Which of the following may be expected?

- Short stature
- Galactorrhoea
- O Positive pregnancy test
- Anosmia
- O Lanugo hair



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English French



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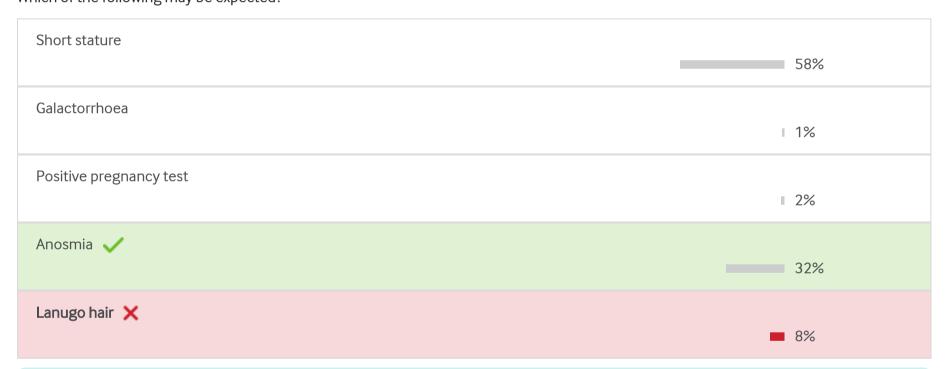
 Oestradiol concentration
 68 pmol/L
 (130-450)

 LH
 3.2 mU/L
 (3-10)

 FSH
 4.2 mU/L
 (3-10)

 Prolactin concentration
 350 mU/L
 (50-450)

Which of the following may be expected?



Key learning points 🛭

Endocrinology

• Congenital GnRH deficiency (hypogonadotrophic hypogonadism) due to Kallmann's syndrome is associated with anosmia, deafness, colour blindness and midline deformity.

Explanation

This patient has primary amenorrhoea, with hypogonadotrophic hypogonadism but normal prolactin. The most likely diagnosis is Kallmann's syndrome and anosmia would be expected.

Kallmann's syndrome is a common cause of hypogonadotrophic hypogonadism and inheritance is variable. Other associated abnormalities include midline defects particularly cleft palate, colour blindness, and deafness.

When suspected on the basis of the clinical presentation or physical findings, the diagnosis of congenital GnRH deficiency should be confirmed biochemically. The diagnosis requires the following findings:

• The demonstration of prepubertal serum concentrations of sex steroid hormones (serum testosterone in males or serum oestradiol in females).

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- Low or normal serum LH and FSH concentrations (usually less than 4 to 5 IU/L) rather than the high concentrations expected with primary gonadal failure.
- Otherwise normal anterior pituitary function

Hypergonadotrophic hypogonadism with elevated LH and FSH would be expected in Turner's syndrome, therefore, short stature would not be an appropriate answer.

The low oestradiol excludes pregnancy.

Lanugo hair is a feature of anorexia nervosa which does not fit this case.

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English French

Question 97 of 100

A 22-year-old female presents with a one year history of secondary amenorrhoea and a five year history of facial hirsutism.

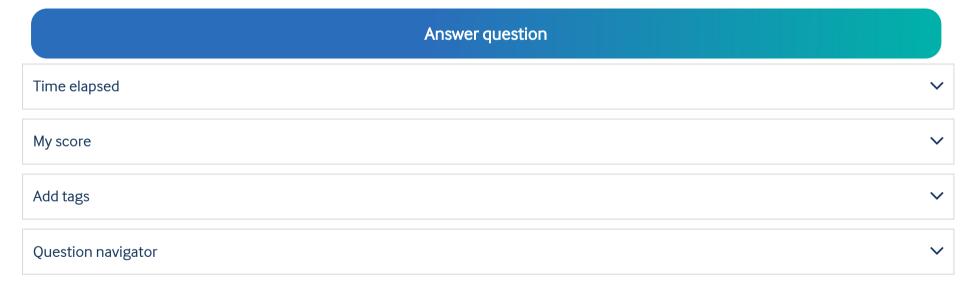
Examination reveals normal female secondary sexual characterisits with mild facial hair and hair extending up to the umbilicus and tops of thighs.

Investigations reveal:

Oestradiol concentration	65 pmol/L	(130-450)
LH	3.2 mU/L	(3-10)
FSH	3.5 mU/L	(3-10)
Prolactin	320 mU/L	(<450)
Testosterone	3.4 pmol/L	(<3)

From the following list, select the investigation that may provide useful diagnostic information.

- O Transvaginal ovarian ultrasound scan
- O Dehydroepiandrosterone sulphate (DHEAS) concentration
- O 17 hydroxyprogesterone (17 OHP) concentration
- O Sex hormone binding globulin (SHBG) concentration
- Karyotype



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English French



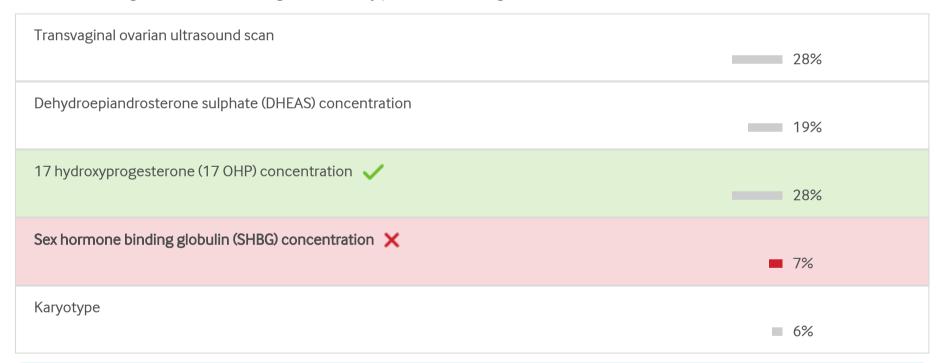
A 22-year-old female presents with a one year history of secondary amenorrhoea and a five year history of facial hirsutism.

Examination reveals normal female secondary sexual characterisits with mild facial hair and hair extending up to the umbilicus and tops of thighs.

Investigations reveal:

Oestradiol concentration	65 pmol/L	(130-450)
LH	3.2 mU/L	(3-10)
FSH	3.5 mU/L	(3-10)
Prolactin	320 mU/L	(<450)
Testosterone	3.4 pmol/L	(<3)

From the following list, select the investigation that may provide useful diagnostic information.



Key learning points $\, \, \mathbb{Q} \,$

Endocrinology

• A raised 17-OHP concentration is diagnostic for CAH

Explanation

This patient has hypogonadotrophic hypogonadism, a slightly raised testosterone concentration and hirsutism.

Non-classical <u>congenital adrenal hyperplasia</u> may account for this picture and a 17-OHP concentration above 33 nmol/L would be diagnostic.

Cushing's syndrome may also account for this picture and a urine free cortisol could provide useful information.

This is not a <u>polycystic ovary syndrome</u> (PCOS)/primary ovarian problem as the normal concentrations of luteinising hormone (LH) and follicle-stimulating hormone (FSH) with low oestradiol reflect hypogonadotrophic hypogonadism.

Normal oestradiol would be expected in PCOS.

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A high oestradiol with high prolactin would be expected in pregnancy.

An ovarian testosterone secreting tumour would be expected to be associated with far higher testosterone concentrations.

This patient was found to have non-classical congenital adrenal hyperplasia (CAH).

CAH is most commonly due to a defect of 21 hydroxylase and may present variably from birth with salt wasting syndrome and ambiguous genitalia, through childhood with <u>precocious puberty</u>, to adulthood with primary or secondary amenorrhoea and hirsutism.

Next question

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English French

Question 98 of 100

A 58-year-old male presents to the endocrine clinic for annual review.

Six years ago he presented with visual field defects and was noted to have a large pituitary tumour. He underwent successful surgical removal of a non-functioning pituitary tumour and received cranial irradiation radiotherapy.

Post-operative assessment at the time revealed partial hypopituitarism, and since then he has remained well on hydrocortisone 10 mg BD and thyroxine 150 µg daily.

Currently he feels quite well but is aware of lack of libido.

Serial MRI has revealed no recurrence of his pituitary tumour.

Endocrine investigations performed by the endocrine nurse prior to the clinic reveal:

Random serum cortisol	768 nmol/L	(120-600)
Free T4	21.2 pmol/L	(10-22)
TSH	<0.05 mU/L	(0.4-5)
LH	1.1 mU/L	(1-10)
FSH	0.5 mU/L	(1-10)
IGF-1	7.8 nmol/L	(18-37)
Testosterone	7 nmol/L	(9-35)

A DEXA scan requested by the SpR at the last appointment reveals average T scores of -2.3 and -2.1 at the hip and spine respectively.

What is the most appropriate treatment to prevent the progression of his bone loss?

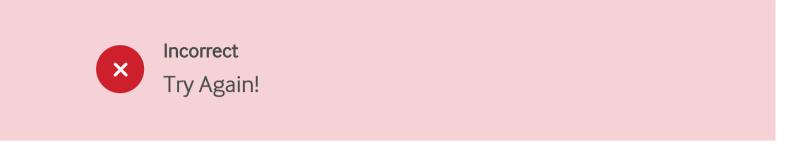
- Reduce the dose of thyroxine
 Reduce the dose of hydrocortisone
 Add alendronate
 Add testosterone therapy
- Add growth hormone therapy

Answer question Time elapsed My score Add tags Question navigator

9/10/24, 12:07 PM **BMJ OnExamination Assessment**

BMJ On Exam

English French



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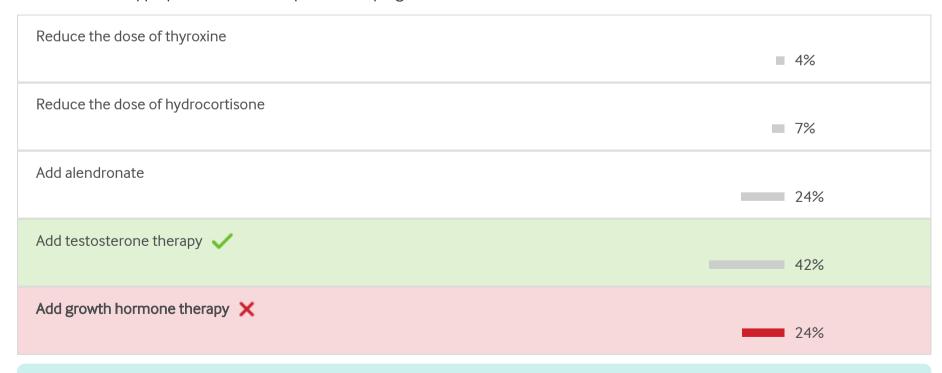
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Key learning points 🛛



Endocrinology, Pharmacology

• Testosterone replacement may improve bone mineral density

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Explanation

This patient now appears to be panhypopituitary as reflected by the low testosterone (with low luteinising hormone/follicle-stimulating hormone [LH/FSH]) and his low insulin-like growth factor (IGF)-1 is suggestive of growth hormone (GH) deficiency.

A random cortisol concentration is meaningless and this is likely to have been taken in the morning first thing after he has taken his hydrocortisone.

There is no relevance at all in having measured his cortisol and he is taking an appropriate minimal replacement dose of hydrocortisone.

The low TSH reflects the fact that he is pan-hypopituitary and not secreting TSH.

Thus the important level to monitor is his T4 concentration and ensure that this is in the normal range.

His osteopenic bone mineral densities on dual energy x ray absorptiometry (DEXA) may be a reflection of his hypogonadism. This appears to have developed since he has received radiotherapy for the residual pituitary tumour.

Replacing the testosterone in the first instance is the most important manoeuvre in preventing further loss of bone.

There is no relevance in giving bisphosphonates as he is on a replacement dose of steroids not treatment dose and is not osteoporotic.

Also GH therapy is licensed for treatment of symptoms with reduced quality of life on adult growth hormone deficiency assessment (AGHDA) questionnaire score rather than as a treatment for bone loss.

The most effective treatment therefore to improve bone mineral density (BMD) in this patient's case would be testosterone therapy.

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Question 99 of 100

☆ High impact question

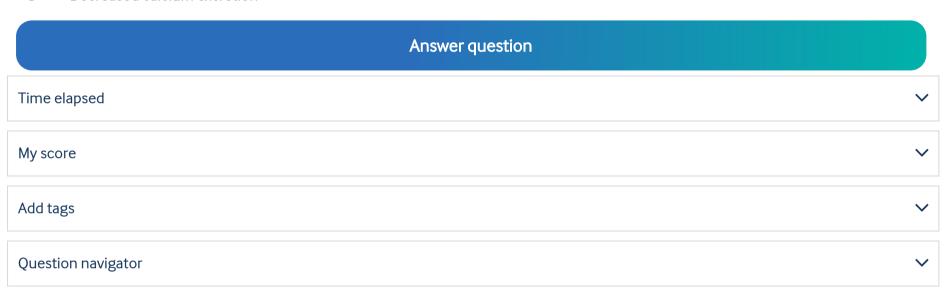
A 71-year-old woman presents to the falls clinic for review of her osteoporosis medication.

She has been maintained on weekly alendronate but complains bitterly of symptoms of gastro-oesophageal reflux and has been admitted overnight to the medical ward with coffee ground vomiting in the past three months. A recent DEXA scan has revealed a T score for the femoral neck of -4.5.

You elect to start denosumab therapy.

Which of the following correctly fits with the mode of action of denosumab?

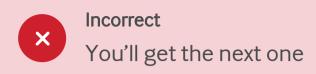
- O Increased calcium absorption
- Increased osteoblast formation
- Decreased osteoclast formation
- Increased osteoblast survival
- O Decreased calcium excretion



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BMJ On Exam

English French



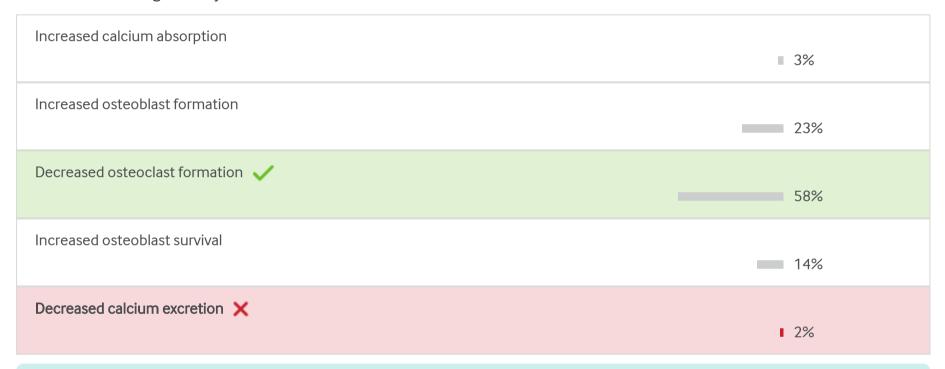
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Which of the following correctly fits with the mode of action of denosumab?



Key learning points 🛭

Endocrinology

• Denosumab is a RANK-ligand inhibitor used in osteoporosis which works by reducing osteoclast formation.

Explanation

Denosumab is a RANK-ligand inhibitor.

RANK occurs on the surface of osteoclast precursors and osteoclasts. Inhibiting it leads to reduced osteoclast formation, function and survival. This leads to reduced bone reabsorption in both cortical and trabecular bone.

Denosumab does not directly affect changes in calcium absorption or excretion and does not affect osteoblast function.

For these reasons only decreased osteoclast could possibly be correct.

Next question

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BMJ OnExamination Assessment

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Question 100 of 100

A 68-year-old man was admitted to the acute medical assessment unit with a one day history of epigastric pain. The pain had started suddenly as a sharp central abdominal ache but by the time of admission the pain was unremitting, severe and radiating through to his back. He had vomited several times.

There was no past history of other medical problems. On further questioning, he reported a history of headaches that had occurred intermittently for several years and of occasional feelings of low mood and low self-esteem. He had lost approximately 4 kg in weight over the previous eight months. Over the past five or six months he had been getting up to pass urine several times at night.

He lived alone. Since his wife died six years previously he seldom left the house. He had a son and daughter who did not live locally. A neighbour did his weekly shopping and he also received 'Meals on Wheels'; he had a home-help visit him twice a week.

On examination he appeared unwell. He was pale and slow to respond to questions. His tongue and mucous membranes were dry and there was loss of skin turgor. His temperature was 37.5°C, pulse 130/minute and regular, BP 110/60 mmHg. Heart sounds were normal and chest was clear. On palpation of his abdomen there was marked central and epigastric tenderness with no guarding or rebound tenderness; there were no palpable organs, bowel sounds were absent. Rectal examination was unremarkable.

Urinalysis: glucose ++, protein +, ketones +

Investigations revealed:

Hb	149 g/L	(130-180)
WBC	14.1 ×10 ⁹ /L	(4-11)
Platelets	450 ×10 ⁹ /L	(150-400)
MCV	94 fL	(80-96)
Sodium	133 mmol/L	(137-144)
Potassium	3.9 mmol/L	(3.5-4.9)
Urea	18.1 mmol/L	(2.5-7.5)
Creatinine	177 μmol/L	(60-110)
Bicarbonate	19 mmol/L	(20-28)
Calcium	2.9 mmol/L	(2.2-2.6)
Phosphate	0.7 mmol/L	(0.8-1.4)
Glucose	37.2 mmol/L	(3.0-6.0)
Albumin	24 g/L	(37-49)
Bilirubin	18 μmol/L	(1-22)
Alkaline phosphatase	88 U/L	(45-105)
AST	23 IU/L	(1-31)

Which of the following would be the most useful investigation to guide his immediate management?

O Glycosylated haemoglobin

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Arterial blood gases

Insertion of central venous pressure line

Parathyroid hormone assay

Peritoneal aspiration and lavage

Answer question

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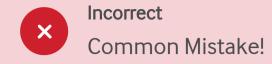
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Question navigator

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English French



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